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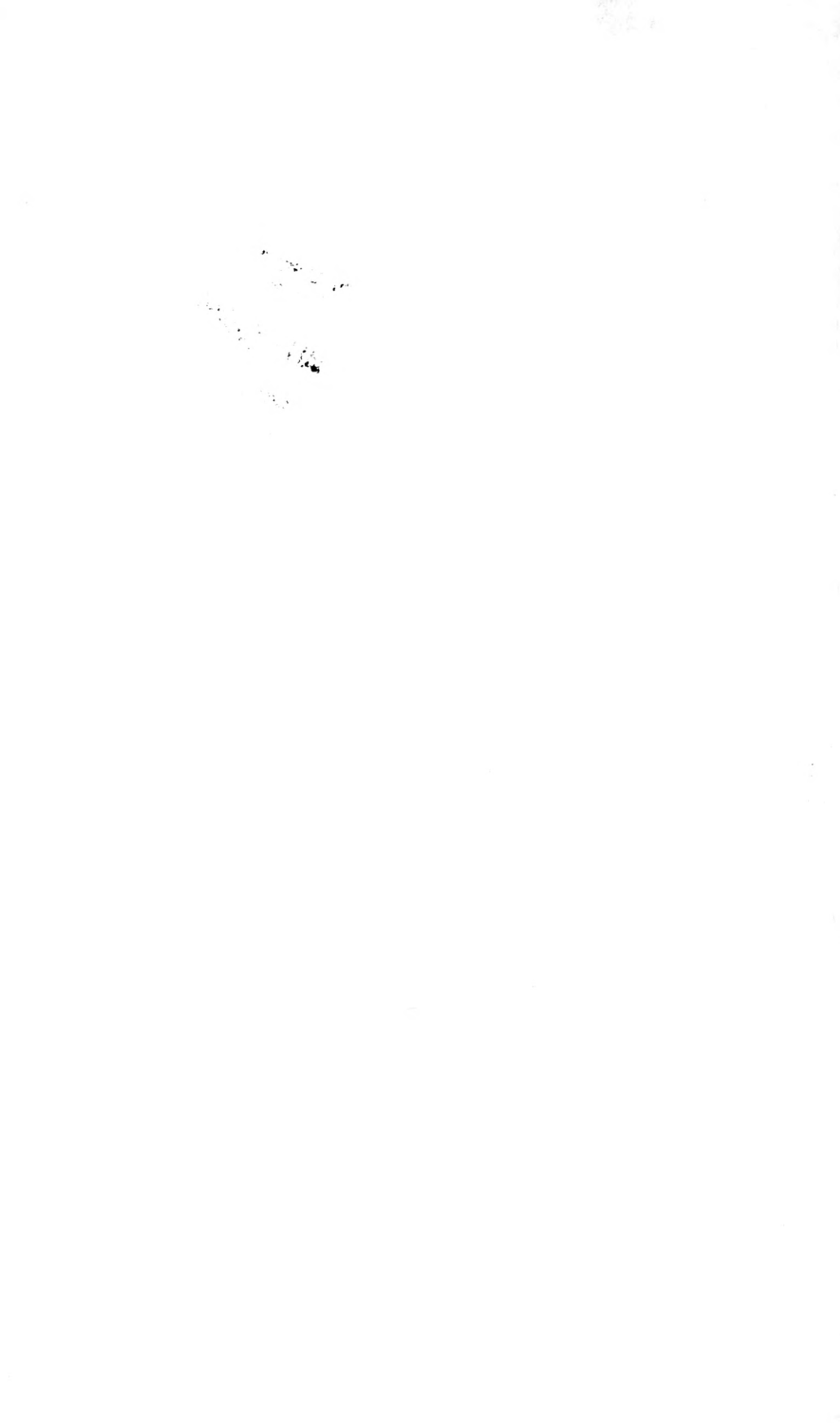
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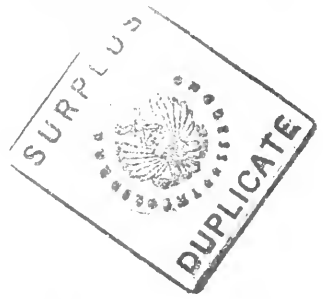
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THE JOURNAL OF TUBERCULOSIS.

A Quarterly Magazine Devoted to the Prevention and Treatment of Tuberculosis.

KARL VON RUCK, B. S., M. D., EDITOR.

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S. H. VON RUCK, M. D.

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ORIGINAL CONTRIBUTIONS.

TUBERCULOSIS OF THE MIDDLE EAR.*

BY DR. ALFRED BRUCK, BERLIN, FIRST ASSISTANT TO PROF. JACOBSON.

The diseases of the organs of hearing in tubercular individuals, on account of their peculiar course, claim our especial interest. That tuberculosis can attack the ear as well as other organs was known to earlier authors; as Romberg, Grisolle and Nelaton. However the discovery of the tubercle bacillus by Robert Koch has caused physicians to study this process more minutely than they had previously done.

In regard to the frequency of tubercular ear affections but scattered statistics are available. Schwabach (1) found among 139 phthisics of one hospital 8 who suffered from aural suppuration, or 6.9 per cent.; among 139 tubercular patients of another hospital 11, or 7.9 per cent. Considerably smaller is the percentage according to the statistics of Moldenhauer (2), who, in a sum total of 294 tubercular subjects, found in 35 cases only, a disturbance of hearing of one or both ears, with or without purulent secretion.

Only in seven cases, i. e. in 2.4 per cent., could the diagnosis of a tubercular disease of the ear be made with absolute certainty. According to Bezold (3) tuberculosis of the ear is not at all a rare complication;

* Translated from the manuscript by Dr. S. H. von Ruck.

(1) *Schwabach*, Ueber Tuberculose des Mittelohrs, Berlin Klinik, Heft 114.

(2) *Moldenhauer*, Zur Statistik der Erkrankungen des H6rorganes infolge von Lungentuberculose, Monatsschrift f. Ohrenheilk., 1885, No. 7.

(3) *Bezold*, Ueber das Verhalten der im Verlaufe von Phthisis pulmon. auftretenden Mittelohreiterungen unter dem Einfluss des Koch'sschen Behandlung. Arch. f. klinische Medicin, Bd. 47, 622.

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while Steinbrügge (4), although he admits indeed, the frequency of disease of the auditory apparatus in tubercular patients, still leaves open the question as to whether we are dealing with the local appearance of a general tuberculosis or with a coincident infection by other germs.

On the other hand Habermann (5) in 17 instances in which the petrous bone of tubercular subjects was anatomically examined, succeeded eight times, i. e. 33.3 per cent.; and Schwabach, in 26 cases even 16 times, i. e. 61.5 per cent., in confirming the disease of the ear passage as tubercular.

In general, from the results of clinical, pathological and anatomical examination, we may assume as certain that the ear is comparatively often affected with tuberculosis. Yet every ear affection coming under observation in the course of a tuberculosis, must not be considered as a tubercular process.

What are, then, the special indications which justify us in speaking of tubercular ear disease, particularly of a tubercular middle-ear affection?

Without exception authors agree that the inflammation begins almost entirely without pain; and usually also without fever. Furthermore tinnitus aurium is, as a rule, moderate. The first symptom by which the patient's attention is directed to his ear trouble, is the hissing of air through the ear during the act of sneezing or of blowing the nose. From this the discovery is generally first made that more or less abundant secretion is present in the auditory canal. In some cases only a slight moisture is noticed. Very often the patients are quite unable to say definitely when the first symptoms on the part of the ear have manifested themselves. Also later in the course of the disease painful sensations are usually lacking.

In contradistinction to these but slightly noticeable symptoms, stands the destructive tendency of the disease. With exceeding frequency multiple perforations of the drum membrane occur, which from ulcerative destruction of their edges quickly increase in size and become confluent; so that sometimes within a few days a large or even the major

(4) *Steinbruegge*, Patholog. Anatomie des Gehörorgans Berlin 1891.

(5) *Habermann*, Neue Beiträge zur patholog. Anatomie der Tuberculose des Gehörorgans. Sitzungsbericht des Vereins deutscher Aerzte in Prag. März 1888.

part of the drum is destroyed. The discharge becomes ill smelling; it is sometimes of a thin fluid or smeary consistency and sometimes crumbly or grumous. Matters progress—with rapidly increasing difficulty of hearing—to an ulcerative caseous breaking down of the mucosa, dissolving of the ligamentary apparatus of the tympanic cavity, exfoliation of the ossicles, and carious or necrotic destruction of the exposed bony structures.

If one, with the aid of the mirror, probe carefully, he often feels rough bone, even in the external auditory canal, more frequently on the walls of the tympanic cavity, but especially on the promontory. Occasionally one finds granulations in these situations. Here and there a smeary cheesy secretion adheres to the remnants of the drum membrane in the niches of the promontorial wall; this in spite of careful cleansing can be removed only with great difficulty, or not at all.

The carious destruction involves at times only the superficial layers of bone; but often it progresses deeper and attacks with especial predilection the Fallopian canal, causing paralysis of the facial nerve. In the aural cavities enlarged by progressive ulceration greater or smaller sequestra are found. The capsule of the labyrinth itself is usually invaded only in small circumscribed areas. Particularly one finds fistulous openings in those parts of the semicircular canals which lie against the wall of the antrum.

Conspicuous in these destructive processes is the slight reaction of the surrounding healthy parts. Even there where the disease of the bone advances outward to the periosteum, or inward to the dura, occur no granulatory formations worth mentioning, no demarking inflammation, no abscesses in the neighborhood. Comparatively rarely do intracranial complications bring about a lethal termination: death occurs—even in extensive caries of the pyramid of the petrous bone,—as a rule, through the coincident involvement of the lungs. Very frequently the extent of the disease of the bone is not even recognized clinically, since it, as well as suppuration in the middle ear, often appears only in the last stages of pulmonary phthisis.

In other cases in which also the original tuberculosis assumes a more chronic course, it is to be admitted that the ear affection is prolonged for a greater space of time.

An especial complication which has been observed in tubercular caries is the erosion of the carotid canal and even of the artery itself. This is

almost without exception fatal. Only in one case, published up to date, was the profuse haemorrhage checked by ligation of the carotid—Broca with Jolly (6).

How can one explain the origin of this affection with its various complications? Generally tubercular disease of the middle ear makes its appearance in the course of a manifest, or of a latent pulmonary tuberculosis. The infection of the ear by the tubercle bacillus, probably results, in the great majority of cases, from particles of sputum that have been forced through the Eustachian tube into the tympanic cavity by coughing, blowing of the nose and sneezing. This infection is facilitated by the fact that the tube, especially in phthisical subjects, being frequently deprived of its adipose tissue, is more pervious. The bacilli lodge in the mucous membrane of the middle ear and give rise to the formation of superficial nodules—miliary tubercles. Subsequently such formations are to be found in the deeper layers and even in the bone itself. According to the investigations of Barnick (7), the bacilli can also, through the blood enter the mucous membrane and the bony walls of the middle ear. One finds then, on the drum-membrane, yellowish or yellowish red, sharply circumscribed, hard nodules of the size of a pin head which soon undergo ulcerative disintegration, giving rise to multiple perforations. In the further course of the disease the tubercular infiltration advances into the deeper layers of the mucosa. According to Schwartz gray or yellowish white masses (consisting of detritus and pus cells which have undergone fatty degeneration) and miliary tubercles are disseminated throughout the mucous membrane. Soon occurs ulcerative and caseous destruction of the mucosa; the process attacks, as already mentioned, the bones, and the bony walls, more or less destroyed by caries, are covered with cheesy masses containing tubercle bacilli or with areas of granulation tissue extending deeply into the bone.

If we take into consideration all that has been said, we can establish the fact that there exists a so-to-be-designated typical form of middle ear tuberculosis which is characterized in the beginning and in its subse-

(6) *Jolly*, De l'ulcération de la carotide interne. Arch. general de med., Juillet 1866.

(7) *Barnick*, Klinische und patholog. anat. Beiträge zur Tuberculose des mittleren u. inneren Ohres. Arch. f. Ohrenheilk. xxxx 81.

quent development by the absence of pain and by its tendency to cause, in a short time, extensive destruction.

However, not in all instances does the course of the disease advance in the manner pictured above. There are patients whose general condition is relatively good: here the process in the ear may come to a standstill or may even heal of itself. The suppuration gradually diminishes under proper treatment and finally ceases entirely. Still the perforation rarely becomes closed, while the tinnitus and difficulty of hearing persist, though perhaps in a lesser degree. If one examines the ear in a later stage, the drum membrane, i. e. as much of it as has been preserved, appears very pale; and one sees that the edges of the perforation have grown to the promontory wall.

In other cases suppuration continues or ceases for a longer or shorter period of time. Only later when the pulmonary affection takes a decided turn for the worse, there appears also on the part of the ear, an exacerbation; and the previously mentioned complications ensue.

Of peculiar interest are the cases which simulate an acute purulent otitis media. Swabach describes two of these rare cases whose tubercular nature was positively proven by the demonstration of tubercle bacilli in the purulent discharge from the ear. Habermann (8) provides similar observations; and is of the opinion that the pains may probably be best explained by a mixed infection at the beginning of the disease; and that the later appearing painless otorrhoea may be referred to the presence of the tubercular process in the middle ear.

However, according to various authors, for instance Ribbert (9) and Buchner (10), the possibility that the tubercle bacillus may independently cause an acute inflammation is not excluded.

A middle-ear suppuration in a tubercular patient is then to be with absolute certainty considered as tubercular only when the tubercle bacilli can be demonstrated in the discharge. The staining of the specimen is to be obtained in the well-known manner with carbol-fuchsin; the

(8) *Habermann*, Ueber die tuberculöse Infection des Mittelohres. Zeitschr. f. Heilkunde vi, 367.

(9) *Ribbert*, Die Wirkung des Tuberculins. etc. Deutsch. medic. Wochenschrift. 1892, No 16.

(10) *Buchner*, Kuerze Uebersicht ueber die Entwicklung der Bacterienforschung. Muenschen medic. Wochenschrift. 1891, No. 25 u. 26.

decolorization with HCl-alcohol, 3 per cent; and the contrast with a watery solution of methylene blue.

It is nevertheless not to be forgotten that tubercle bacilli, in spite of even the most painstaking examination, sometimes can not be found; although the tubercular nature of the disease is subsequently confirmed at the autopsy. Failure to find tubercle bacilli does not contradict the diagnosis of a tubercular affection. In such cases the clinical observation decides; but above all the presence of certain typical symptoms which we have already described. To these belong painless beginning and course of the disease, rapidly increasing impairment of hearing, multiple perforations, rapid destruction of the drum membrane and of the mucosa of the tympanic cavity. On probing one finds bare or rough bone: relatively often facial paralysis exists.

The prognosis of middle ear tuberculosis is almost always bad. Complete healing is exceedingly rare; and even the suppuration does not very often tend to cease. Yet even a mastoiditis, as Körner (11) has observed, may be permanently relieved by an operation, presupposing again that the disease of the lung has not greatly diminished the resistance of the patient. On the other hand there are numerous cases in which the discharge continues in lesser amount for a long time while the process itself remains stationary. But here also there occurs a rapid change for the worse as soon as the pulmonary tuberculosis assumes greater activity. To be judged particularly unfavorable are those cases in which from the beginning the general condition of the patient has been a weakened one, i. e. where fever and night sweats exist. Here the ear affection as a rule runs a rapid course. The occurrence of facial paralysis is always an untoward sign; since it appears usually, only in the last stage of the disease. Haemorrhage from the carotid is practically always fatal. The ear affection of itself, as has been stated, causes death in exceptional cases only. Also intra-cranial complications, such as thrombo-phlebitis, meningitis and brain abscess, are seldom the causes of a fatal termination. It is true that tubercular disease of the transverse sinus can lead to a dissemination of tubercle in the lung or to a general miliary tuberculosis; but nevertheless death results in the vast majority of cases from the pulmonary tuberculosis.

(11) *Körner*. Die eiterigen Erkrankungen des Schäfenbeins. Wiesbaden 1899. 136.

THERAPY. It is always of importance to improve the patient's condition according to generally accepted principles; for, by these means, in conjunction with a course of careful local treatment the ear disease is also ameliorated. Directed against the suppuration, according to the amount of secretion, a douche with boiled water is to be employed once or twice daily: this should be followed by loosely tamponing with sterile gauze. In some instances the tamponing is sufficient. Where foetid suppuration is present I use a solution of formalin, 4-6 drops to $\frac{1}{4}$ litre of luke-warm water which has been boiled, employing the antiseptic balloon syringe of Prof. Jacobson for douching out the ear. Where the defect in the drum membrane is great, we can make a trial of the treatment with powder. I have obtained good results from a powder consisting of one part of euprophen to four of very finely pulverized boracic acid. Before using it the ear should first be carefully syringed out and then wiped out with surgical cotton. If tough masses of secretion are present, a five per cent. carbol-glycerine solution is dropped into the ear once or twice a day, after which the ear is syringed out as above stated. For granulations absolute alcohol is especially serviceable; it should, however, at first should be diluted with a double amount of boiled luke-warm water, and gradually less water being added until finally, when the sensitiveness has disappeared pure alcohol may be used. Larger granulations must be cauterized with nitrate of silver, chromic acid fused on the end of a probe, or the sesqui-chloride of iron: while polyp-like tumors are to be removed with the snare. To radical operative measures one will probably seldom resort, but when he does, it is of the utmost importance that the general condition of the patient be good. Recovery, as several publications have shown, is not entirely excluded, although in most cases, in spite of the operation, the process continues after a period of quiescence. An absolute indication for a mastoid operation would be a primary tubercular mastoiditis; which indeed very seldom occurs. Here, however, complete cure may be obtained. In children also, a radical operation may produce a cure; because in them the process is often localized in the temporal bone. But entirely hopeless are those cases with rapidly progressing destruction of the drum membrane and of the mucosa, in patients already much debilitated by their lung affection.

TUBERCULOSIS OF THE KNEE JOINT AND OTHER CASES IN ORTHOPEDIC SURGERY.

A CLINICAL LECTURE.*

BY DR. DANIEL W. MARSTON, INSTRUCTOR, ORTHOPEDIC SURGERY, NEW YORK
POST-GRADUATE MEDICAL SCHOOL AND HOSPITAL; VISITING
SURGEON DAISY FIELDS HOSPITAL FOR
CRIPPLED CHILDREN.

The first patient this afternoon is a typical case of the suppurative stage of tuberculosis of the knee. It presents many clinical features that we do not often see, except in the neglected cases from the crowded tenement districts. This boy is ten years old and has a tuberculous family history. The story of his present illness dates back sixteen months, when while playing ball with his school-mates he received a fall which caused more or less lameness in the left knee. At the time of the accident the injury was regarded as trivial and the boy, although a little lame, was allowed to continue at school. In a few days, however, the symptoms increased in severity, the lameness was especially marked, and the little fellow complained of considerable pain, particularly at night. The usual routine treatment of blisters and poultices was then instituted, but without the least benefit to the patient. The knee gradually became much larger, the flexion more marked, and the boy was unable to straighten the limb. At this time he was taken to a clinic where the limb was enveloped in a plaster-of-Paris dressing and the mother instructed to bring the youngster back for further treatment in about two weeks. This dressing was continued intermittently for some months, but did not prevent the formation of an abscess in the joint, which was allowed to rupture spontaneously. The sinus that you now see has existed since the evacuation of the abscess cavity.

It is of the treatment of this kind of cases that I will speak particularly. The aetiology and pathology is practically the same as that of hip disease about which I lectured last week. At first the treatment is of course largely prophylactic. If these cases are seen early in their history it is possible with proper care to avoid the extensive destructive changes present in this joint. The treatment is both constitutional and local, although too often one or the other of these is neglected. Consti-

* Delivered before the New York Post-Graduate School and Hospital, Nov. 18, 1900.

tutional treatment consists of plenty of good food, good air, cheerful environments and careful attention to the general health. Beefsteak, cream and eggs, are better general tonics than cod-liver-oil and creosote. These drugs, however, have their place in the treatment of these cases; too often to the exclusion of the more common dietetic agents. I have noticed in this hospital that after operations upon cases coming from the over-crowded sections of the city, if the little ones are returned to their tenement homes the disease often recurs and they are again seen at our dispensary, candidates for further operative treatment. If they are sent to our country hospital at Englewood they usually make a permanent recovery, which certainly proves the value of combining hygienic treatment with the mechanical and operative.

When a case of knee-joint disease comes to your office it is a good plan to first of all be sure of your diagnosis. The child's gait will teach you a great deal, as I have often shown you here. Having seen the patient walk, repeat to yourself mentally, at least, if not verbally, that magic combination of symptoms which will unlock the diagnosis of any case of knee-joint disease. See how many there are present out of the eight cardinal symptoms.

- I. Pain.
- II. Heat.
- III. Swelling.
- IV. Pain upon joint pressure.
- V. Limited motion.
- VI. Atrophy.
- VII. Muscular spasm.
- VIII. Deformity.

If you are able to detect any three of these symptoms you can rest assured of your diagnosis. Physiological rest is an important factor in the treatment of these cases. Put the patient in bed. Apply extension to reduce the deformity caused by the muscular spasm. Direct your extension in the line of the deformity. You will recall what I said of lateral traction in the axis of the neck of the femur in the hip cases last week. In the case like the one now on the table, where the knee is considerably flexed, do not apply your extension to the leg and then simply throw the weight over the foot of the bed. By so doing you will create extension, it is true, but the patient will bitterly complain of the pain caused thereby. This is because you are making a fulcrum of the con-

tracted ham-string tendons and with the tibia as a lever are creating intra-articular pressure. To apply the extension in the direction of the deformity it is best to put a hook in the ceiling and from it run a wide bandage behind the head of the tibia. This will lift the head of the bone forward, and will prevent the longitudinal traction over the foot-board from creating the painful and destructive intra-articular pressure. Place pillows around the limb to protect it from the slightest jar.

A leg like this one will take an extension weight of four pounds possibly increased to seven, and will require two weeks time at least to straighten. Apply the extension straps as in hip disease, but do not run them above the knee. When the deformity is overcome and there is present no muscular spasm, place the child on a large sheet of wrapping paper and trace an outline of the limb from the tuberosity of the ischium down along the inner side of the limb and around the sole of the foot and up the outer side of the leg to half an inch above the trochanter major. Take the circumferential measurements at the groin and just above and below the knee. Send this measurement here and a brace like the one my assistant will show you is made. This is known as the Thomas knee brace. Thomas, of Liverpool, however, did not believe in extension, and that feature of this brace did not originate with him.

The measurements above and below the knee are important, for unless these bands are properly adjusted there may occur a tendency to subluxation of the tibia. These bands draw the head of the tibia forward and hold backward the lower end of the femur. The shoe of the opposite side should have an elevation of two inches applied to the sole. This brace has several advantages over plaster-of-Paris. It is light and cool and provides extension that can be regulated by the attendant. In overcoming these deformities force is to be avoided, as by such methods it is possible to create a traumatic dissemination of the germ life which has caused all this disturbance. You will not see all cases in the incipient stage, and abscess formation may have already taken place when the patient comes under your care. In all such instances by all means immediately evacuate the abscess cavity, with all antiseptic precautions, and remove all necrotic tissue either in the soft parts, or in the bone. In previous years many surgeons have objected to this radical treatment of these abscesses on the ground that free incision opened up fresh area for further septic inoculation. It is now our custom to forestall this pos-

sible complication by a method inaugurated in orthopedic work by Dr. Phelps, and which consists of a literal baptism of the abscess cavity with pure carbolic acid, allowed to remain in contact with the tissues for exactly one minute. Absolute alcohol is then generously applied and neutralizes to some extent the caustic action of the acid. Bi-chloride of mercury solutions are then used in irrigating the joint. Phelps no longer uses the old collapsible rubber drainage tubes, but is committed to the use of glass tubes not unlike the old Ferguson speculum. These are used in sizes proportionate to the width of the incision and allowed to remain as the wound heals from below.

Typical restriction of the knee joint in children under fifteen years is not now recommended, where any other treatment can be substituted, because of the subsequent shortening of the limb. A thorough scraping, operating, or arthrodesis, is preferred which does not interfere with the development in the epiphyseal line. In patients of mature years excision is performed. Following any such operation the joint should be protected for at least eighteen months or two years. The injection of iodoform emulsions I have entirely discarded, and this method is now never used in the hospitals with which I am connected. The aspiration of joints of this kind is worse than useless and a waste of valuable time. I will have this patient admitted to the hospital and will show her to you after a week's treatment.

Here is a case of cured hip disease. This little woman came to our Post-Graduate Clinic some five years or more ago. A Phelps lateral traction hip brace was applied, which she wore for four years. Neither did anyone move it for her. Both passive and active motion of the knee and hip were strictly forbidden, and, by the application of that brace, made impossible. Yet, here she walks with freely movable joints. She has no angular deformity. The limb is half an inch shorter than its healthy mate, but this is not noticed because the shoe is built up in the sole. With your hip cases treated with this hip brace no patient need recover with angular deformity. Such cases are not seen in this clinic unless they come from other institutions where they have been allowed to wear the old fashioned "long traction brace" which does not immobilize the joint or afford it much protection.

This case just placed upon the table is one in which I show you another excellent case of knee joint disease, presenting the characteristic deformity. As you see, a plaster-of-Paris dressing has been applied from

the middle of the leg up to the groin. You wish to know, however, what is the pathological condition present in the joint, it is not enough to know that there is disease in the knee joint. You observe that the limb is flexed, the foot rotated outward and that there is partial dislocation or subluxation of the tibia backward, which produces the outward rotation of the foot. The flexion is caused by the spasm of the flexor muscles, notably the biceps. She complains of pain, there is evident swelling, there is perceptible elevation of the temperature of the part, there is pain on joint-pressure, there is marked atrophy, spasm of muscle, and deformity.

It cannot be synovitis, as there is no effusion. The disease is both intra-capsular and extra-capsular, because the pain on joint-pressure shows that there is intra-capsular disease, and the swelling indicates that there is extra-capsular disease. The thickening of the bone and the atrophy of the limb indicate that the disease is in the bone. The pain is referred to the inner condyle, so I can locate the focus of the disease. When I pull on the internal lateral ligament she says it hurts. She will be admitted to our orthopedic department and I will apply fixation and extension until the deformity is overcome. She will then be another candidate for the Thomas knee brace.

[Then followed a number of interesting orthopedic cases, but not coming within the field of *The Journal*, we have taken the liberty of omitting them.—Ed.]

THE USE OF IODOL IN THE TREATMENT OF TUBERCULOSIS OF THE LUNG.

BY T. MELLOR TYSON, M. D., PHILADELPHIA.

VISITING PHYSICIAN TO RUSH HOSPITAL FOR THE TREATMENT OF CONSUMPTION,
ASSISTANT PHYSICIAN TO THE HOSPITAL OF THE UNIVERSITY
OF PENNSYLVANIA.

The treatment of pulmonary consumption by inunction of some one of the preparations containing iodine is not a new one and most of those who have written on this subject recommend the preparations containing the largest amount of iodine. In recent papers great efficiency has been claimed for euiophen, which contains 27.6 per cent. iodine, and iodoform, which contains 33 per cent. It has been found that patients in

the incipient stage under this treatment have improved, while it has been claimed that some were cured. In the advanced stage improvement was reported, but no cures. In the far advanced cases no benefit resulted. It is reasonable to suppose that any preparations containing a large quantity of iodine would be still more beneficial.

When used by inunction digestion is not interfered with, as it is by creasote and iodoform when given by the mouth. By this method a larger dose can also be administered, and as it causes no irritation of the skin, the treatment can be kept up indefinitely.

I have been using iodol, which contains 88 per cent. of iodine, or more than three times as much as europen and more than twice as much as iodoform, for the last two years in all my cases of consumption at the Rush Hospital with marked improvement in the various symptoms. This was only temporary in the advanced cases, but in the incipient cases the improvement continued as long as they were under observation. The improvement covered general conditions, strength, weight, cough, expectoration, dyspnoea, appetite and even physical signs, although the last were not as much influenced as some of the advocates of this treatment claim. It may be that the weight and strength improved, because digestion was not interfered with, as it is by nauseous and irritating drugs.

To take up the improved symptoms in detail, i.e. some of the incipient cases the cough and expectoration disappeared entirely, while in others they diminished gradually and much of the discomfort therefrom disappeared. The greatest change in the physical signs was a diminution in intensity in the abnormal breathing sounds. The previously harsh bronchial or broneho-vesicular sound became soft and the expiratory sound seemed to be less marked. Rales that were heard over the affected area seemed to be markedly diminished and in some cases to disappear altogether. The other physical signs were not altered.

Of the last fifteen cases admitted to the hospital, the greatest increase in weight was 20½ lbs., and the least one pound, even in those who died the weight had increased. The cough had entirely disappeared in four and was markedly diminished in three, in four there was no increase in this symptom, and in the remaining four the cough gradually became worse. The expectoration was diminished in four cases, in five there was no change and in the remaining six it gradually increased in quantity. The dyspnoea entirely disappeared in two, and became gradually

less in five, while in the remaining eight it did not abate. Strength and appetite even in the advanced cases improved for a time. There was no marked change in the temperature, except in the incipient cases where there was a tendency to fall.

All the cases were hospital ones. In addition to the iodol inunctions, they received strychnia 1-25 grain three times a day with good nourishing food and proper out-door exercise. The inunctions contain twenty grains to the ounce of olive oil. The quantity rubbed in was a drachm three times a day, increased to half an ounce gradually, say, by about a drachm a week. The rubbing is done by the patient himself and requires about ten minutes to rub in the whole quantity.

It will be seen from the foregoing, that there are no reported cures, and that the physical signs were not as much altered as has been claimed. The cases in the incipient stage were kept under observation for some time, but eventually disappeared. The advanced cases ultimately died from the disease and the far advanced ones died in the hospital.

A CASE OF TUBERCULOUS POLYNEURITIS.

BY CHARLES J. ALDRICH, M. D.

LECTURER ON CLINICAL NEUROLOGY AND ANATOMY OF THE NERVOUS SYSTEM, COLLEGE OF PHYSICIANS AND SURGEONS; NEUROLOGIST TO CLEVELAND GENERAL HOSPITAL AND DISPENSARY; NEUROLOGIST TO CLEVELAND CITY HOSPITAL.

C. De O., male, white, single, forty years old and a freight conductor by occupation, was first seen at the City Hospital; his illness was of four years duration; previous health good; his mother died of tuberculosis, a sister was then sick with the same disease and he was almost in the last stages of the same disorder. His active tubercular condition had apparently existed but one year, before which time he was well nourished and apart from his nervous system was seemingly a healthy man.

In October, 1891, while a conductor of a freight train, he was exposed to wet and cold. He felt tired and chilly for a week and experienced dull, vague pains in the back and limbs. He began to cough and had much pain in the right lung. He became so ill one night that he called a physician. He had a high fever, pain in the side and a severe cough and a diagnosis of pleuro-pneumonia was made. His flesh became exquisitely sore and tender to the touch, sharp, shooting pains

were felt throughout the body but most severe in the legs. Cold aggravated these pains. The skin about the legs became swollen, blue, shiny and tender. He was a month in bed and it was two months before he could stand on his feet. Both feet and hands were numb and were subject to pins-and-needles sensations. The bladder power was at no time lessened. Unable to feel his feet on the floor he could not walk in the dark. He was anesthetic in a varying degree over the trunk and extremities, anesthesia being most marked in the hands and feet, into which he could thrust pins without discomfort. He had double wrist and double ankle-drop.

Examination:—The pupils reacted neither to light nor accommodation; were slightly irregular, the left being larger than the right. The elbow-jerks, knee-jerks and ankle phenomena were absent. He had paralysis of the left abducens and double vision. No other paralysis was noted above the hips. The extensors of the thighs and legs were markedly weakened and presented the reaction of degeneration. The bladder power was unimpaired, although sexual function had been absent four years.

Tactile, pain, muscular and temperature sense were natural over the head, arms, trunk and thighs down to a line at the upper border of the patellae, but below this point all of these senses were less acute than normal. His sense of posture was poor, being unable to stand with eyes closed, and showed general muscular incoordination of the lower extremities. The presence of incoordination in the upper extremities was doubtful. He had suffered much from shooting pains in the thighs and legs.

The optic disks presented no sign of atrophy to ophthalmoscopic examination, but the charts of the eye fields showed marked contraction of the field for color, especially for green. Dr. W. H. Bruner has my thanks for the ocular examination of this case.

Careful inquiry into his condition from 1891 to '92 and '93 gave conclusive evidence that he had many symptoms of tuberculosis, the infection, however, was stoutly resisted by his previous rugged habit. With the history of the case, its development and its course, I feel that we are warranted in pronouncing it one of polyneuritis of tubercular origin.

612 Prospect Street.

CARE OF TUBERCULOSIS.*

BY MRS. LEW WALLACE, JR.

It is hardly necessary to say that this paper is possible only by the courtesy of men who have devoted their lives to the study of tuberculosis, and who have given me generously of their information. Among these are Dr. Karl von Ruck, editor of the *Journal of Tuberculosis*, Dr. Hurty, of our own Board of Health, Dr. S. Case Jones, of the New York Board of Health, Dr. Da Costa, of Philadelphia, Dr. Potter, of Indianapolis, and Dr. Knopf, of New York.

It is now positively known that the direct cause of consumption is a specific microbe without which no true infectious tubercle can exist. The presence of this bacillus in diseased tissues, its liability to enter the organs of respiration and digestion, and the communication of this germ from man to man, beast to beast, and beast to man again, are now well known facts. So alarming has been the spread of this disease that medical men all over the world have been concentrating their thoughts upon it for the last ten years. The crusade against this "Great White Death" was formerly begun by Dr. Ernst in Leyden in 1894 before the Congress of Hygiene at Berlin, when in an inspiring address he denounced tuberculosis as "the greatest of all human plagues." In 1899 was also convened in Berlin a convention for the sole purpose of joining the hands of the world to understand and relieve this scourge. Germany had need of her congress for 180,000 die yearly of tuberculosis, and 1,300,000 are always under sentence of death. England, with the Prince of Wales at the head, followed with a society for the "eradication and sanitation" of tuberculosis. As a coronation gift, Wilhelmina of Holland endowed an enormous public sanatorium. Oscar of Sweden has given immense sums for sanatoriums all over his kingdom.

In the United States there is in New Mexico an army hospital for tuberculous patients, but so far, the states have not apprehended the need for these buildings; though New York has a hospital projected in the Adirondacks. The Pennsylvania Society for the Prevention of Tuberculosis distributes tracts in order to show the public the danger daily lurking among them; and Dr. Da Costa states that mainly through

* Read before the Indianapolis Flower Mission, September 27, 1900.

the efforts of this Board of Health the death rate has fallen in fifteen years from 15 per cent. to 10 per cent.

Chicago has an active society; and some of its churches have adopted the individual communion cup, since the theory of germs being carried in the wine became a fact. This was demonstrated by the Brooklyn society which for one year watched and discussed with experts nothing but this question, and proved the hypothesis by finding in the dregs of the wine active tuberculous microbes. One church in our city has discarded the communion chalice also. Cincinnati has an isolation hospital under Dr. Lyle, as has Denver, also.

Now, when we know that 60 per cent. of all living people are or have been infected with consumption, that it is infectious, and the germs are fostered by dampness, impure air, bad food, close contact, as in schools and tenements, is it not the State's business to bestir itself and give freely of its power and money to the boards of health to enable them properly to house the sick poor, see that plenty of fresh air and sunlight reach the wretched consumptive and instruct his family how to avoid contracting the disease; or else provide an isolation hospital where the doomed patient may be received and cared for so that he shall lack no comfort and shall not be a source of danger to all with whom he comes in contact. The actual outlay would be little greater, if at all, than the townships now bear; and the safety of all inhabitants of the state would be augmented vastly.

And so about our own state. Do you know that 30,000 consumptives are dying each year in Indiana? Do you know that 5,000 reach the grave each year? The State cares for the blind, the deaf, the insane, in separate institutions, and even for its criminals: why not for the consumptive? In Indiana are 92 counties with 1400 townships, each township averaging three pauper deaths a year from tuberculosis. Say the father, the bread winner, is the one slowly dying, the mother able to do nothing outside for the common support of the family except care for the sick man and perhaps for little children. The State cannot let them die of starvation, but is forced to unwind the windlass gently that lowers the dying into his grave, as Dr. Prayton puts it, and the cost of keeping a roof over their heads, supplying fuel, light, medicine, clothing and food for perhaps a year amounts to about \$150 at the lowest estimate. Three of these consumptives a year means \$450, on an average, for each of the 1400 townships, or \$630,000

a year for the state, and it is money thrown to the winds except as it may alleviate somewhat the sufferings of the patient; for he has been left in ignorance to spread the germs of the disease through his house, clothes, family and probably to the kindly neighbors, who in easing his last hours may be paving the way for their own journey along the same path.

Each consumptive is a center from which the disease can be scattered broadcast. In Owen County is a house known to the Board of Health as a consumptive house, and there are many of them throughout the state. It is an old, dilapidated hovel with rotten board floors, walls thick with layers of ancient dirt, and germ laden paper, torn off in spots showing the filthy, broken plaster, and this house has in twelve years sent out twelve deaths from successive tenants to prove how fierce is the clutch of this great white death! And yet the Board of Health has not been able to get this house condemned and burned down, disinfection never being thorough unless the walls are perfect. How long would any of us allow a neighboring house to furnish each year a death from smallpox or diphtheria? Each life has its value to the State. A jury generally allows \$5000 damages for a life taken carelessly, call it \$1000 to be conservative. If our Hospital for Tuberculosis cured only 100 patients of the 5000 who die each year (and the per cent. would be far more than that) the State would have saved itself \$100,000, to say nothing of the great decrease of the disease owing to its isolation. In our prisons are hundreds of men coughing their lives away among thousands of other prisoners, all of whom are liable to go out when their sentence expires, stricken also and spreading the germs through their respective cities. Our Hospital for the Insane feels deeply its lack of separate wards for the consumptive as does also the City Hospital, the latter being more than concerned, knowing that consumption is more easily acquired in a feeble body than a healthy one. So it goes on, an ever widening circle. Is not the State responsible for this? It protects its citizens from scarlet fever, diphtheria, smallpox, yellow fever, why not tuberculosis? In Havana from 1890 to 1894 there were 1000 deaths from yellow fever and 7000 from consumption. Did we quarantine for the latter? However, if the State is not ready to act at once to save her people, we of the Flower Mission can do the duty that lieth near us and the first great step to take is to instruct the individual patient that he will be only too glad to avoid drawing those near and

dear into the Valley of Death with him. The first precaution is to properly destroy all tuberculous discharges so that it is impossible for them to enter the air and be inhaled, to be deposited on food as dust or to enter the water used in cooking. For these reasons the expectoration which contains 9-10 of the bacilli must not be allowed to dry. The second step is to carefully watch the milk supply and see if the herds have been tested and passed by the Board of Health, milk being the most potent factor among foods for disseminating tuberculosis germs. Both of these we can do, remembering always consumption is curable in its early stages and that it is almost never hereditary, not one child out of 800 examined being found infected, so that by due precaution the child of tuberculous parents may grow up a credit, or discredit to its State's fostering care.

ORIGINAL TRANSLATIONS.

THE PSYCHOLOGY OF THE CONSUMPTIVE.*

BY DR. MAURICE LETULLE,

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Of all the chronic diseases which attack mankind, pulmonary tuberculosis is certainly one of the most widely diffused, and perhaps the best known. There still remains in our knowledge of this subject certain short chapters in reference to which the published documents, by far too scanty, have not definitely established a condition of equilibrium: such a one is that which refers to the *psychical and intellectual state of the consumptive*. Do these phthisical patients present from the very first certain modifications in cerebration? And do these perturbations present characters sufficiently constant to permit of a general description?

I

INTELLECTUAL CONDITION OF THE CONSUMPTIVE.

At the debut of pulmonary tuberculosis, at a time when the bacillary infection has not yet caused extensive ravages, and during a term of

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months impossible to define, the intellectual aptitudes (I am speaking of a young rather than an elderly patient) are as a rule well conserved. The daily avocations and favorite occupations are continued without notable alterations in the mental state. Frequently, moreover, by reason of a sort of a functional excitation the intellectual aptitudes are sharpened in a singular manner. At first surprised and then disquieted, the friends of the patient assist at this flowering of his qualities, and exacerbation of his intelligence. Memory, judgment, finesse in reasoning, critical sense—all these mental reactions are placed in evidence, either simultaneously or successively, and often with wide amplitude. This phenomenon appears the more striking, because the physical forces, far from keeping pace with the mental faculties, remain stationary, to shortly exhibit an actual decrease. Then the pale features, emaciation, anorexia, and general anaemia, all contrast strongly with the intellectual activity of the young consumptive.

Little by little, in proportion to the onward march of the pulmonary lesions, the mental peculiarities undergo attenuation. The period of failure is announced at first by intermittent and transitory indolence. The intellectual effort has become more laborious and its elasticity is lost; and in proportion as the mind loses its vivacity, it is occupied by longer periods of repose, of non-production. Brain work is performed only by fits and starts—by rythmical crises, so to speak.

Almost parallel with this rise and fall in intellectual vigor, we see another manifestation develop—a veritable overexcitability of the mental faculties. The patient, at a time when he appears to be nothing more than a “candidate for tuberculosis,” is distinguished by his numerous projects, which are sometimes carried out. In business, we see him make new combinations, changes, journeys, investments. This man, far from being in an agitated condition has need, we feel, of a free course for his activities. More than once these desires for a change are not justifiable, and are done simply for the pleasure of doing. With brilliant eyes, and business air, this man hastens, feverishly full of life, and pursues his affairs with an ardor which is often poorly regulated. At other times his zeal is animated by affection for others, for friendship. Again, it is the social world which may be the occasion of similar crises of activity; our young consumptive wishes both to live and to be seen. He appears in all functions, where he exhausts himself, a victim to an

unconscionable vanity. In brief these "erethetic" tubercular subjects astonish their public; and their intimates, who love them for their actual virtues, will see this stage of excitement pass rapidly into cachexia.

The following detail is not without interest: sometimes the patient is entirely unconscious of this transformation in his intellectual state and never does become aware of it; while another patient has a very exact notion of his metamorphosis. "It is stronger than I am" he says to the advice prodigally given to him. "I feel the need of giving free rein to myself. After me, the end of the world." Sometimes these patients appear to be only partially conscious of this consuming existence.

At the time when the body is mined with tuberculous lesions and broken down by the feverish pace which we have just depicted, the intellectual life of the consumptive, with a few exceptions, is again transformed. We shall see later that from the moral point of view, these patients are actually ailing from that time henceforth. Some are filled with illusions as to their condition, others are resigned, others again are discouraged and depressed. All, or nearly all, exhibit a *general lassitude of intelligence* which will continue to dominate the scene. This cerebral idleness becomes the inseparable companion of the exhaustion of the material forces of the organism. As the muscles are flaccid costing much more of an effort to the human machine so poorly nourished and maintained, so the encephalon of the consumptive now hesitates and hardly produces anything unless with great effort; a veritable intellectual neurasthenia, which is almost always encountered, either up to death or if a recovery ensue even *after* the health is restored—in those rare cases which recover after the disease has progressed thus far.

No more passionate study for the litterateur, artist, or scientist; no more professional life. Indifference is born, it is imprinted on the features, for at this period all consumptives have a certain resemblance, almost to the point of featural identity.

The power of attention is soon exhausted, at least in respect to lively moral emotions. The rousing of the psychical impressionability, with its intense intellectual reflexes, may still be possible in connection with those individuals who are beloved by the patient, and also especially with whatever concerns himself and his disease. Thus we may see the patient follow, with almost religious devotion, the prescriptions given him by his medical adviser, even when the severest therapeutic hygiene is

required. The unfortunate consumptive studies his case with a method, a perspicacity, a constancy, which are the more remarkable because they are sustained only by the hope, too often deceived, of approaching recovery.

The progressive incapacity for prolonged cerebral efforts contrasts very often, in the case of the intelligent and enlightened, with the preservation, if not the accentuation of the capacity for the study of the pathological ego. With the conservative and distinctive idea deeply rooted that "he must live," that "he will live," and that "he can live," the consumptive enters sooner or later into a sort of auto-suggestive condition, in the course of which all that remains of his intellectual forces are concentrated *in study of himself*: his appetite, his sleep, his different visceral functions, his fever, his sweats become his sole care, and at least the dominating occupation of his life.

However, one must not suppose that this brain, so indifferent to the rest of the surroundings, so preoccupied with itself (this of course partly owing to the very precise directions of the physician) has actually become impotent, and that the spirit like the body, has entered into decay. The memory, for example, remains faithful and as exact as of yore. It is only necessary to test it to receive proof of this. But left to itself it becomes fixed upon certain recollections. And as sadness is the rule with these patients they are often pleased to dwell upon that part of the past which has been laborious or painful, either in professional or social life. Up to the last day the judgment of the consumptive is correct, as is likewise his reasoning; in rare cases in which he is called upon to transact business, and in matters concerning his interests, he knows how to regulate his affairs to the best advantage, to uphold his rights with a tenacity and at times with an asperity which is based upon an im pregnable logic.

His will, likewise, remains in a majority of cases exact and full of firmness, in accordance with the character of the patient before the beginning of his illness.

It happens often, by reason of the moral conditions, the development of which we shall consider later, that the mind of the patient becomes disembarassed of a certain hesitancy, of reserve, which in the former state of health had often proved an ennuibrance; and that the timid

individual becomes intractable, if not ferocious, in the defense of his interests.

During this time, master of himself, conscious of his acts, possessing, as in full health, his arbitrary freedom, our patient will come to conclusions which seem paradoxical, yet which if followed up to their source become perfectly logical. How many consumptives, for example, "condemned by their physicians" and feeling touched to the core, abandon themselves during the last few months to a most unreasonable existence, and to the most exaggerated excesses? In over-exertion of this sort, every excess demonstrates the fact that they have determined to "make short and merry" that life of which the last beautiful days, they know, must be counted parsimoniously.

The immense majority of phthisical patients, rich or poor, live to the last in full recognition, with a full comprehension, at times terrifying, of the progress which their malady is making. It happens at times, however, in the course of phthisis that the consumptive presents a special condition of the brain, a curious mental disposition, characterized by a sort of *chronic delirious illusion*, in virtue of which he believes himself to be improving in health day by day, in proportion as his strength fails and the disease advances. This *semi-dementia* (which may often be encountered in physicians, druggists and veterinarians who have become consumptive) is easy to recognize, for the patients betray themselves at every moment, so to speak. This mental state leads the patient gently and painlessly to the border of the tomb, in a state of "euphonia," unreal, distressing to the relatives and friends of the sick man but very comforting to the latter himself. Such patients die with a smile on their lips. As a general rule this psychopathic condition develops not long before the fatal issue.

II.

THE MORAL NATURE OF THE CONSUMPTIVE.

It will be useful, in studying the spiritual condition of the consumptive, to follow the same order as in the preceding chapter. Some patients, who might be called the "elect" of the phthisical subjects, undergo no more change in the moral than in the intellectual life, whatever be the form or the duration of their malady. If their character when in the state of health was mild and even, or energetic and of high tension, it so remains up to the last moment. In such patients, with

unchangeable *morale*, those of the first type are resigned, tender and expansive, full of remembrance and affection for those who try to console them, just as they were disposed, when perfectly well, toward those whom they cherished. The other sort, brave and strong, view their approaching end with a moral rectitude, a rational courage which they have always shown throughout their lives in the fulfillment of duties. But souls of these species are the exceptions. A great number of tuberculous subjects are touched on the moral as well as the intellectual side. The same individuals who undergo a period of "intellectual erethism," as already studied, experience a corresponding and similar *psychical irritability*. This metamorphosis in their morale consists essentially of an alteration of character, which takes place with more or less rapidity, and which is never overlooked. This young man or young woman whose temper has always been even and cheerful, becomes irascible, sensitive, quick to take umbrage. Crises of sadness, accesses of variability of humor assert themselves while the patient is unable to explain their occurrence. Another individual, of a well balanced temper, becomes changed all at once, and independent of any efficient cause, into a new being, unjust, bitter, fantastic, without, however, to the extent of going beyond what would be regarded as moral limits. At most it is but a "bad disposition," and far from being a psychosis. The reverse of this alteration could hardly occur, and it is very exceptional to see tuberculosis exert any refining or softening influence upon characters which have, from infancy been regarded as "bad" or "disagreeable." The rule, in regard to pulmonary phthisis, is that moral defects whether congenital or acquired, are exaggerated and never attenuated.

An almost constant phenomenon is the somber quality of the disposition. Sadness is the rule in tuberculosis. In conjunction with indifference it imprints itself upon the features, independent of the age of the patient and indelibly. In hospital life the consumptives associate without gaiety, and their reunions, even amid the most varied distractions are tinged with sadness. Other things being equal, this gloominess of character is proportional to the weakening of the organism and the neuropathic depression of the forces.

Consciously or unconsciously, these psychical modifications are often accompanied, especially in males, by corresponding modifications in the moral nature. *Egotism* is awakened, or better, is accentuated.

The patient, still in fair health, but disquieted by those depressing visceral impulses which announce his coming breakdown, exalts his ego, and concentrates upon himself the whole of his psychical existence. As a general rule, he no longer takes account of the possible consequences of his acts and of their moral worth. His logic, implacable (as we have already seen) impels him to the immediate gratification of his desires, to their complete realization. Excesses, when he is still capable of them, even sexual excesses (a phenomenon sufficiently common at the commencement of the disease), are checked only when the limit of exhaustion is attained.

Henceforth, and however idle his acts may seem, this solitary personage lives only for himself. His moral life thus finds itself profoundly simplified, in proportion as the critical phases of the disease progress.

Sad and self-contained, voluntarily isolated, abandoned to his presentments, the tuberculous subject who has arrived at the period of phthisis often pleases himself by what might be termed a shrivelling of his soul. He only makes a confidant of his physician, or his nurse, or some relative or devoted friend. Apart from his physical sufferings, and the coughing up of blood, the unlooked for appearance of which terrorizes him as its redness passes his colorless lips, he remains alone in silence for days throughout, enjoying the sunshine, the pure air and his own confidence.

Indifference, silent sadness, solitude of soul, organic sources of apprehension justified all too soon, these are all facts of one sole and tyrannical sentiment, *egoism*; the great foundation, the unique refuge, the only reality and the last passion of the consumptive!

Egoist, the consumptive is to the core. Such he becomes, and even if he recover, such he will remain to the last moment of his life. From the psychological point of view, it may be affirmed without fear of error that of all diseases, tuberculosis is the one which best sustains and exalts to the highest degree the suggestive contemplation of self—a veritable morbid affection of the *morale* which as a rule is radically incurable. “Myself, always myself, and only myself, whatever happens.” This is the state of the soul in most consumptives. Let us note that this “acute egoism” readily explicable to the truth, is not, properly speaking, a disease of the soul, a psychosis. It suffices to set it forth simply as not a vice, but an instinct, the instinct of self-preservation, which the healthy individual has learned to bridle more or less by education,

and to bend to his will, his principles and his labors. None of the other chronic diseases which decimate humanity, cancer, gout, syphilis, nephritis, develop to such a degree the instinctive egotism of man.

Enfeebled by his disease and by his defective functions, the consumptive accepts without reckoning and finds the devotion and sacrifices of those around him only natural. If he thanks those who care for him, whatever their social station, he does not estimate at their real value the pains which are taken in his behalf by his servants, his friends and his nearest of kin. The small tradesman who becomes ill does not trouble himself after the methods by which his wife and children obtain his drugs, his food and comforts deemed of use in his treatment.

A working man does not come to the hospital (of which he has an instinctive fear) until after he has spent to the last penny the savings which belong to his wife and children. A woman of the world does not marvel at the long and repeated journeys undertaken to visit her, nor at the fatigue imposed upon her husband and her children who coddle and wait on her for months, and upon the chamber attendant who watches her, day and night, through an entire winter.

"Enjoy the present moment" without desiring, for a single instant to calculate the consequences, to care to know the cost—this is a dominant quality of the soul of the consumptive.

If now we wish to study the moral qualities, we will also find that everything is present here which might be termed *applied egoism*.

Almost invariably (bearing in mind the exceptions to a rule which cannot be absolute), the affections of the consumptive seem, if not obscure, to be least related to his own personality. Love, if felt at all, will be nothing but egoism exteriorized; not for an instant will any real sacrifice of self be made for the sister soul chosen by his desire.

Those passionate flames which may be seen, at the beginning of the disease, to illuminate the life of the unfortunate, become reduced in time to certain glimmerings, as pale, as cold and as artificial as their duration is brief.

We also see, almost invariably, that this kind of affection is passive, is reactional, so to speak; and is attractive rather than altruistic. It is love, "the flower of the soul;" not profound love—passion without devotion and sacrifice. It is still himself whom the consumptive loves, and

for how short a time, in his weak idyls, devoid of tenderness and without sincerity.

It is the same with friendship. The consumptive receives and accepts the affection offered to him. He contributes nothing to the sentiment.

But if he has closed his heart to deep and generous affection, if he refuses to himself these rebounds of the soul, that inexhaustible source of heroic devotion, there is one conservative sentiment which his egoistic and plastic soul often cultivates to the very foundation: *jealousy*.

Women, in particular, are accessible to this sentiment, which springs directly from their egoism, and the "jealousy of consumptive women" is a current notion in phthisiology. The tuberculous subjects attract to themselves whatever might be useful to them. The affection of others is for them a resource which is comforting and reviving: to it they blindly attach themselves. Quickly enough there arrive special exigencies; but the friends must never leave, never forget them. They shall never think of another, never wait on another, or eat or sleep out of the invalid's company. In a word they must consecrate themselves, body and soul to their invalidism and live only for their care. Examples of this absorption on the part of the consumptive for those around him, are innumerable as well as diverse. For my own part I cite voluntarily the petty jealousies of my tuberculous hospital patients, unfortunates disinherited of a sweet and simple soul, who watch painfully, not forgetting to keep account, the moments passed by the physician at the bedside of their nearest neighbor and companion in misfortune. The jealousy among consumptives may, as is well known, extend as far as insanity; and no one longer keeps account of the cases in which a jealous woman in advanced phthisis, assassinates her husband, and then commits suicide upon the body of her victim. In order to be certain that "he would not forget her." Must it be said that a consumptive may be deprived of all the fine qualities of the soul? Certainly not, and to cite an example, *acknowledgement* is frequently seen in these patients. Often, at least as far as words go, the tuberculous subject shows his or her gratitude for the devotion and good offices which have been received. But here, oftener than once, the real sentiment, unavowed and unavowable, is still egotism. To thank one for the attachment which he has shown to you, is it not to ask in a definite fashion for a continuance of the same? To show by a generous gift an acknowledgement to his retainers, is it not

the best and most certain method to secure a doubling of the solicitude and attentive cares? And is not the consumptive sustained, often up to the last moment, by an impatient hope of cure?

The consumptive loves his physician; proofs of this abound, but he loves him more, perhaps, because he expects through him to recover, rather than for his efforts to care for him.

In contrast to this precious virtue (rare enough in other ailments) of acknowledgement, we must indicate the opposite sentiment of *spite* which is common enough in the soul of the consumptive. This element of rancor may even extend to *vindictiveness*, without, however, causing the patient to habitually perform acts which require energy or intrigue. In a general way the consumptive is deficient in forbearance; often his spite is out of proportion to its cause. Physicians in sanatoria are aware of this frame of mind in their patients, which is almost invariably the result of the inaction and the contemplative life imposed upon them by the routine of their treatment.

Every wearisome circumstance, every accident which disturbs the rest at night or compromises the recovery, becomes grave fault in the eyes of the invalid who is deeply egotistical. Misfortune to the person who from motives of interest, for family reasons, comes to disturb his quiet: he will hardly forgive him. And should circumstances supervene which will enable the patient to get revenge for the suffering caused him, he will know how to take advantage of them, even to the point of cruelty.

In this egoism, ferocious from force of unconsciousness, no psychopathological trace has been penetrated. We recognise here nothing more than the last defense of an organism touched to the core. We teach the consumptive that he must husband his forces and that every infraction of this law will be followed by an aggravation of his malady. But in default of this teaching, the consumptive would not tarry in taking account of its provisions; and if dangers appear he seeks to ward it off, if opportunity offers, at the expense of others. His ill will, when he exerts it against those who have done him harm, is nothing other than a reactionary manifestation, a sort of defence.

If it is true that "great thoughts come from the heart," evil sentiments to a certainty, originate most frequently in the diseased viscera; the dyspepsia of neurasthenia will demonstrate this point, if necessary.

But tuberculosis is a massive disease, all the substance of the body is in decay. How can we expect then to fail to find "bad instincts" in the normal condition of the consumptive?

Despite everything, in the mass of these materially decaying organisms, egoism, coldness, indifference, rancour, vindictiveness cannot be regarded as pathological perturbations of the soul, and furthermore in the immense majority of cases we can justly make use of the phrase *mens sana in corpore laese*. The soul of the consumptive concentrated upon itself, silent—even in poets—no longer opens itself to other than external impressions, and to the vivid suggestions of Nature. It is hardly paradoxical to state that atmospheric phenomena act more upon the tuberculous patient than the best arguments. The sun and its generous rays, the pure light of warm countries, the immensity of the sea, the flowers and their perfumes, the green lanes fill the soul with comfort in assuring a better activity of the viscera.

With every consumptive one should start with that psychological law that always and at no matter what period of the disease, one is in the presence of a doleful moral being, of a soul drowsy in its regrets and in the presence of which all is effaced outside of the desire to exist. This chimerical hope of the phthisical patient explains the most simple of his acts as it justifies all his conduct. The *morale*, the family, love, friendship, exists no longer in his eyes save in a contingent fashion: to still live, however brief the interval, all will be well, all will be just. Sentiments and virtues, the unfortunate sums up everything in self contemplation. Outside of his health, let him avow it or not, nothing exists for him, for his rights and duties are at the mercy of a haemorrhage from his lungs.

To sum up, long before the termination of the dissolution of this wreck of organs,—represented by perhaps a hundred pounds of human substance,—the superior qualities of the soul of the consumptive have been definitely dissociated.

Alone, in the midst of such ruin, the will, memory and freedom of choice persist up to the latest hour, the last defenders of the tortured organism.

REVIEW OF CURRENT LITERATURE.

CASE OF TUBERCULOUS BACILLAEMIA WITHOUT THE PRESENCE OF TUBERCLES,

Barbier and Tollener (*La tuberculose infantile*, Aug. 15, 1900) give a brief report of a condition which they call *bacillosis tuberculosa*, and which they hold to be a third form of tuberculosis—the other two being respectively the miliary, and yellow cheesy tubercles. Landouzy has described such a condition as *antedating* the formation of organic lesions, and both he and Queyrat have claimed that this state of bacillaemia may immediately produce foci of broncho-pneumonia.

The author's patient was a three year old boy, first seen in October, 1899. Three older children had succumbed at a very tender age. The symptoms suggesting tuberculosis. The present case was healthy up to the time of his present illness.

He was taken suddenly, a few days before admission, with cyanosis, cough and fever, and death resulted in about three days after the onset of the initial symptoms.

Autopsy revealed numerous foci of broncho-pneumonia, accompanied by congestive phenomena. The lesions were of the size of a hemp seed. The degenerated condition of the myocardium caused immediate suspicion as to the existence ante-mortem of a toxæmia. The spleen was enlarged and studded with gray granulations. The liver presented appearances analogous to those of the spleen.

Microscopical examination of the broncho-pneumonic foci showed the latter to be sterile. Neither Koch's nor any other micro-organism could be found, despite repeated examinations with various stains. Histologically no evidences were found save those of simple broncho-pneumonia. Examination of the other viscera was also negative.

On the other hand, bits of lung, liver and spleen, were inoculated into guinea pigs, and the animal submitted to the action of the lung tissue became tuberculous while the others remained healthy.

The authors conclude that the lesions of the lungs and other viscera, including heart and kidneys, could be accounted for only upon the supposition of an intense toxæmia, presupposing a bacillaemia.—the latter being unattended with the formation of tubercle in any of the tissues. Apparently the bacilli which inoculated the guinea pig must have pro-

ceeded from the blood contained in the affected lung. No mention is made of a primary focus which supplied the blood with bacilli.

The authors are largely influenced in their explanation of this case by the fact that analogous observations have been already reported by Queyrat and Aviragnet in their recently published theses.

THE ERYTHEMAS OF TUBERCULOSIS.

Professor Raymond of Montpellier (*Le Progrès Médical*, Aug. 18th, 1900) says that an erythema should never be ranked as a disease, despite the habit of the dermatologists to the contrary. It can be but a symptom of some general infection or toxæmia. In addition to those forms which are frankly dependent upon known blood infections, others are wrongly interpreted: for example, so called puerperal scarlatina is nothing else than a septic rash. A good argument to fortify this belief is found in the infrequency of "puerperal scarlatina," since the days of asepsis.

Tuberculosis, like its sister affections, syphilis and leprosy, undoubtedly gives rise to erythemata, which are caused by the presence of toxic products in the blood; and these tuberculous rashes may, like those of syphilis, be macular, papular, nodose, polymorphous, etc.

MACULAR ERYTHEMA.—It has long been claimed that rose spots may accompany miliary tuberculosis, although some authorities dispute the truth of this assertion.

Schlangueieff (1895) stated that he had often seen in the acute forms of tuberculosis, an intense erythema appear about the neck not long before the patient's decease. The rash persisted up to the fatal termination of the cases.

It is a well-known phenomenon of syphilis that a macular erythema may end in a pigmentation *in situ*. Thibierge and Laurent have each seen a similar association in tuberculous subjects (pseudo-pigment-syphilide in tuberculosis). In other words the melonoderma which may occur in the tuberculous cachexia owes its origin to a pre-existent erythema of toxic origin. Other cases of tuberculous erythema have been reported by Bayet, Charcot, DuCastel and Bronson.

Other eruptions mentioned in this connection are a tuberculous purpura, and a zoster believed to be premonitory of tuberculosis. The latter dermatosis forms the subject of a thesis by a pupil of the author (*Rouher: Xona premonitaire de tuberculose*. Paris, 1896.)

PAPULAR ERYTHEMA.—A few cases are upon record of an association between tuberculosis and an erythema in papules (Bayet, Dubrenilt and Ancwe, and Hebra).

NODOSE ERYTHEMA.—The association of ordinary erythema nodosum with tuberculosis is by no means rare. Buisine wrote a thesis upon this subject (Bordeaux, 1892); and Uffelmann has related the occurrence of several cases in which this eruption was a forerunner of tuberculosis. Schamann and several other authors of thèses have discussed the relationship of the two affections, so that quite a large literature already exists, and a considerable number of recorded cases appear to leave no doubt that erythema nodosum is often a forerunner or early symptom of some form of tuberculosis. Under these circumstances the course and clinical character of the eruption do not differ in any way from the ordinary form.

MULTIFORM ERYTHEMA.—With regard to the occurrence of the well-known erythema multiforme in tuberculosis, Besnier has seen such an association. No other cases are quoted.

Raymond states that we can readily understand, being now in possession of definite knowledge of toxins, why an erythema can readily be associated with an affection like tuberculosis. The eruption which follows the infection of tuberculosis itself is the best evidence that a rash can occur during the rapid evolution of phthisis, and especially in the miliary forms, in which the blood is surcharged with both bacilli and toxins.

The author avoids the discussion of the so-called *tuberculides*; for these are not acute rashes but organized and chronic alterations of the skin which may contain anatomical evidence of tuberculous processes. However he ventures the opinion, based on evidence, that lupus erythematosus is a sort of persistent or relapsing erythema of tuberculous origin which tends to become chronic.

SYPHILIS AND TUBERCULOSIS.

Portucalis of Constantinople (*Zeitschrift für Tuberculose und Heilstättenwesen*, July, 1900) concludes a study of this association of disease as follows:

1. When a consumptive is attacked by syphilis, the phthisis is arrested.

2. When a consumptive is attacked by syphilis, the latter disease is of a mild type.

3. The antagonism between the bacteria of these two diseases should cause the toxins to reciprocally neutralize each other.

4. When the micro-organism of syphilis is discovered and cultivated, and its toxins obtained, a serum may be obtained with which consumptives may be inoculated and rendered immune to further ravages of tuberculosis. The collateral effects of the syphilis-serum should be readily antagonized by treatment..

5. We believe that the serum of syphilitic blood in the tertiary stage of the malady would be of value in the treatment of phthisis.

6. The experience of another physician is now invoked. Dr. Monteverdi has studied the same question, bearing well in mind the prevalent belief among clinicians that a consumptive who contracts syphilis rapidly succumbs to the associated infection.

Monteverdi (who reported his observations in *La Semaine Médicale*, Aug. 19, 1899) made the discovery that when a phthisical subject becomes syphilitic, he, so far from having his pulmonary disease aggravated, undergoes remarkable improvement even to the extent of recovery.

As Portucalis reports four cases of recovery in addition to the three previously reported by Monteverdi, we have a material which, although small, should have considerable weight.

We append the notes of a single case (Portucalis, No. 2) to elucidate some of the points made by the author.

A Greek tobacco merchant had lost three brothers and a sister of phthisis. He himself at the age of 23 presented symptoms of the same disease (fever, cough, sweats, weakness, etc.). After a winter in Egypt without benefit, he went to Paris for medical advice whence the doctors sent him to Geneva. Here he contracted a syphilitic chancre which yielded to treatment in 27 days. To his great astonishment the symptoms of phthisis all began to improve at this period, the fever and cough ceasing. The secondary period of syphilis now set in, general eruption, iritis, ulceration of uvula, etc. He underwent nine months treatment for syphilis and then returned to Constantinople where he married. His wife had two miscarriages and bore one still-born child, while the fourth pregnancy terminated in the birth of a living infant which thrived, but presented unmistakable evidences of hereditary syphilis.

Portucalis was called upon to treat this child and came thereby into possession of the facts of the father's tuberculous history. The latter's statements were verified by correspondence with the physicians who had treated him in Egypt, Paris and Geneva.

The father is now 47 years old, and has angina pectoris and arteriosclerosis, but no signs of syphilis or tubercle.

TYPHOID FEVER AND CHRONIC TUBERCULOSIS.

Milian (*La Presse Médicale*, Oct. 17, 1900) states that confusion of these two affections in diagnosis appears almost incredible, yet as a matter of fact it not only does occur in practice, but occurs with frequency. He has even seen distinguished clinicians embarrassed under such circumstances.

Having made a diagnosis of typhoid fever in a given case, the presence of suspicious physical signs at the apex may perhaps cause us to think of the possibility of an acute exacerbation of an unsuspected pulmonary tuberculosis, or even of a coincidence of typhoid fever with tuberculosis. This complication is not a common one, but it is anything but unusual to encounter a coincidence of anomalous thoracic symptoms and an atypical fever curve.

The thoracic symptoms of typhoid fever are often of such a character that they invincibly force the clinician to think of tuberculosis. This conviction is based upon three characteristics, viz: 1. Implication of the apex, 2. Indefinite prolongation of the chest-symptoms, and 3. Tendency of the latter to relapse with frequency.

In regard to the apical localization, it is not rare to encounter, in the course of typhoid fever, a dullness on percussion beneath the left clavicle, associated with roughened breathing and rales having a more or less moist character. These stethoscopic signs are due to broncho-pulmonary congestion, or to habitual bronchitis; or finally to the intercurrent of a spurious broncho-pneumonia, without souffle.

In regard to the matter of indefinite prolongation of these stethoscopic signs, the temperature meanwhile having become normal, it often happens during convalescence—and even after health is fully recovered—that the ear is able to perceive the signs in question at the original foci. The conclusion arrived at would ordinarily be that the typhoid patient had become tuberculous. In the great majority of cases, such a

conclusion would turn out to have been incorrect. In a case under the care of Professor Cornil, in which sero-diagnosis had revealed the presence of typhoid fever, a pneumonia of the right apex developed at the fourth week of the general malady. One month after this complication set in, the patient was discharged from the hospital with roughened inspiration heard at the apex together with crepitant rales audible over the supra-spinous fossa. Three months later these signs had disappeared.

In regard to the question of the frequent relapse of these stethoscopic signs, it is not rare to see a recurrence of broncho-pneumonia in the course of typhoid fever, the symptoms disappearing at the end of two weeks from the date of the first attack. A third and even a fourth recrudescence of this complication have been known to occur. At every such relapse we are forced to think of tuberculosis; yet the lung eventually clears up permanently.

The fever curve of typhoid may likewise undergo peculiar modifications in the course of the principal attack, on the occasion of relapses and during convalescence, which present a certain analogy with the thoracic symptoms, and which may cause us to think of a mistake in diagnosis or of the possibility of a coincidence of typhoid fever and tuberculosis. When these peculiarities of temperature are actually associated with the thoracic symptoms already described, our suspicion and uncertainty of mind become doubled. When the persistence of a fever curve for weeks after recovery from typhoid is associated with the apical signs already detailed, with the oscillations of temperature being of the hectic type, an erroneous diagnosis of tuberculosis following typhoid could hardly be evaded.

This leads us to a discussion of the so-called tuberculization of the typhoid patient. Professor Potain says that this phenomenon is of very rare occurrence. In the course of his long career, he has seen this sequel of typhoid in a very limited number of cases, and as a rule the tuberculosis was under these circumstances of an acute character, and resulted from a lighting up of apical tuberculosis which was present at the time the typhoid was contracted.

The old belief in an antagonism between typhoid fever and tuberculosis is assuredly erroneous, for laboratory experiments show that one disease gives no immunity against the other.

ON THE ORIGIN OF SCROFULA.

Cornet, in his monograph entitled "*Die Scrofulose*" (Vienna, 1900,) has the following to say concerning the etiology of this condition. In a previous chapter, he announces his belief in the existence of two widely differing forms of scrofula, viz: the tuberculous and pyogenic, with combinations of the two. The predisposition is furnished by the age (childhood) and by a certain penetrability of the skin and mucosa, in virtue of which bacteria are able to reach the more deeply seated tissues.

From this point of view, it is evident that the efficient causes of scrofula are the pyogenic cocci and the tubercle bacillus.

It is probable that children develop scrofula in their own homes at a period antedating the time when they play in the streets,—the source of the germs to be sought in their relatives (so-called pseudo-heredity). In the well-to-do ranks, the young children are also especially exposed to serving-women, while in the poorer walks, this class of non-relatives is represented by boarders and lodgers.

The path followed by the germs after penetrating the surface appears to be both central and lateral, along the lymph stream. That is, they travel from a peripheral ganglion to one more centrally situated, while at the same time, by means of the anastomoses of lymph-channels, they also travel from one peripheral ganglion to another of the same sort.

With regard to the method of infection, this varies considerably according to the surface attacked. In the case of the skin, the pyogenic-scrofulous variety is oftener situated about the face and scalp, and most infrequently on the feet and trunk. The skin of the face is notably delicate and smooth in comparison with that of most other localities.

As it is the seat of so many petty troubles, such as bites of insects, pimples, seborrhoea, etc., it is frequently injured by dirty finger-nails in the act of scratching. The same regions are the locality of preference for tuberculous scrofula as well, although for various reasons this is less commonly seen than pyogenic scrofula.

The mucosae are each especially exposed to certain kinds of contact with bacteria. Thus the membrane lining the nasal chambers comes into constant relation with the dust of the inspired air, while the buccal mucosa is exposed to infected articles of diet, the genitals by masturbation and the act of cleansing, etc.

No proof that the scrofula itself is transmitted by inheritance can be

brought forward; but the peculiar porosity of the skin and mucosae might well be handed down from one generation to another.

The factors which are favorable to the occurrence of infection embrace poverty, uncleanness, dampness (seen especially in connection with the prison-life of former days), milk from tuberculous cows, acute exanthemata and pertussis, traumatism of every sort, latent tuberculous foci, etc.

SYMPTOMATOLOGY OF "PYOGENIC SCROFULA."

While this affection has no fundamental connection with tubercular disease, it is extensively considered by Cornet in his monograph, "*Die Scrofulose*," both to distinguish it from the graver form, and also because the two processes may be combined with resulting symbiosis.

This non-tuberculous form of scrofula is by far the more common of the two, and eczema plays an important role in its genesis. This eczema does not differ in any way from the ordinary forms save in its extreme obstinacy. It is seated at the alae nasi, eyelids, scalp, behind the ears, etc., and may be papular, vesicular or pustular, with resulting redness and weeping, or formation of honey-like crusts. Oedema and permanent swelling develops beneath these superficial alterations, so that the face becomes swollen, the nose and lips thickened, the angles of the mouth fissured, etc. On the limbs and buttocks, the same factors lead to the formation of ecthymatous pustules and ulcers.

No tubercle bacilli occur in the secretions of any of these lesions save by the veriest accident.

Pyogenic scrofula of mucous membranes presupposes the existence of a chronic catarrhal condition analogous to the eczematous process in the skin. In the nose we may have either a catarrhal or purulent inflammation, with obstruction of the nasal passages by crusts. Exceptionally even the deeper tissues may participate (perichondrium, cartilages, septum); and destructive ethmoiditis may originate in this manner. There is further no doubt that a form of ozaena occurs as a phenomenon of pyogenic scrofula, which fact corroborates the teaching of old clinicians that ozaena is a most typical lesion of scrofula. It is particularly well established that there is nothing tuberculous about ozaena.

On the other hand the attempt to make of adenoids a lesion of pyogenic scrofula is unwarranted.

Numerous laryngologists describe "scrofulous" ulcers of the throat which are not tuberculous and which probably belong to the simple scrofulous lesions.

Chronic otitis media is placed by Cornet among the most typical lesions of pyogenic scrofula. The course of these processes in the so-called scrofulous tissues resembles the behavior of the same affections in a merely cachectic individual.

The eye, as is well known, presents a number of diseases which are scrofulous without being tuberculous—blepharitis, phlyctenular conjunctivitis and keratitis, pannus, and affections involving some of the bones which form the orbit.

We now come to the consideration of the affections of the lymph-ganglia which occur secondarily to the superficial lesions just described. And here Cornet makes the remarkable statement that as far as these ganglia are concerned there are no differences between simple and tuberculous scrofula in the earlier stages, and that while stationary persistence and caseation generally imply tuberculosis, these phenomena may occur in the pyogenic form. In his chapter on the pathology of pyogenic scrofula, it is stated that after the development of the first stage of fibrous hyperplasia, a stage of fibrous hyperplasia or induration follows and may persist for a long time. If this condition does not go beyond a certain point, fatty degeneration may cause natural resolution (scrofula fugax), only a slight induration remaining as a witness. But if such resolution does not occur, the ganglion is likely, whenever virulent germs are borne to it, to develop pyogenic foci, which become confluent and burrow into the surrounding tissues, causing periadenitis, phlegmonous suppuration and finally cicatrization.

Cornet even thinks it possible that all "scrofulous" bone and joint lesions are not tuberculous.

In another part of his book, describing the course of pyogenic scrofula, he states that the lymph-ganglia can give the body better protection against the pyogenic cocci than against the tubercle bacilli. While general tuberculosis occasionally develops from a tuberculous lymph-ganglion, a corresponding propagation of purulent infection from a gland the seat of pyogenic scrofula is almost unheard of.

Again, any such thing as a cachexia in connection with pyogenic scrofula is never present to any considerable degree, so that this form may safely be styled a *benign* scrofula.

Regarding "mixed scrofula," this association is frequently found, both kinds of micro-organisms occurring side by side. Pyogenic cocci may be found in a tuberculous ganglion, with resulting tendency on the part of the former to "mobilize" the Koch bacillus. In some cases, however, the symbiosis results conservatively to the organism, for when the pyogenic cocci are so virulent as to excite suppuration, the tubercle bacilli are floated out.

The section on diagnosis of pyogenic scrofula begins with a statement as to the difficulty in distinguishing this form. All the phenomena which belong here—eczema, impetigo, chronic rhinitis, ozaena, otorrhoea, chronic enlargement of lymph-ganglia,—have nothing specific or characteristic about them. Yet in the scrofulous these diseases pursue a course which distinguishes them from the same affections in those who are perfectly sound. In the scrofulous these lesions tend to relapse, to multiplicity and to implication of neighboring glands. Certain stigmata often remain to indicate previous affections—scars, thickening, etc.

TUBERCULOSIS OF THE SUBMAXILLARY GLAND.

Arcoleo of Palermo (*Il Morgagni*, September, 1900) says that the infrequency with which these cases are reported in literature is due in part to the inability of the surgeon to recognize this localization of the disease. He knows of but one other case on record, viz: that reported by Aievoli, in the *Policlinico*, 1895. On account of this paucity of material, he reproduces this case in connection with his own.

Aievoli's patient was a healthy peasant who had noted the presence of a lump in the right submaxillary region for a year and a half. This tumor had enlarged continuously but without pain. It showed no evidence of softening, and when incised by a surgeon gave exit to nothing save a little blood. There was no enlargement whatever in the regional lymph-ganglia.

Aievoli's original diagnosis was syphilitic gumma, but the failure of the anti-syphilitic treatment caused a change of opinion, and led to the extirpation of the mass, which was the size of a large hen's egg. Upon section, the tumor appeared to be composed of a whitish fibrous tissue, containing foci of softened necrotic matter, in which were discovered a

few tubercle bacilli. Aievoli believed that the latter must have reached the gland along its duct.

Arcoleo now describes his own case. His patient was a peasant aged 27 years who had already suffered from tuberculosis of the ganglia in right lateral cervical region. Ten months before consultation, the patient observed a tumefaction in the left submaxillary region. This was treated as a strumous gland, at first with tincture of iodine and later with poultices. The growth of the tumor appeared to have been arrested, and the patient next underwent a short course of iodide of potassium inwardly. Two months later the skin over the gland began to redden; incision was practiced, and a whitish substance, mingled with blood made its escape. Not long after this, the patient went under the care of Arcoleo, who found him robust and well nourished and without of any evidence of tuberculosis in the viscera or elsewhere. The tumor was of the size of a large hen's egg. The neighboring lymph-ganglia were not involved. The skin was reddened over the centre of the mass and pressure caused pus to issue from the site of the incision. A probe introduced into the opening revealed the presence of a small cavity. A diagnosis was made of tubercular lymphoma, and total extirpation was advised. After the preliminary incision and dissection, it became evident that the submaxillary gland was the seat of the tumor. The operation was completed and the patient made a good recovery. The pathological report was similar to that which accompanied the preceding case.

With regard to the etiology of this localization of tuberculosis we are naturally in the dark. The bacillus could reach the gland by the blood route, lymphatic route or Wharton's duct. The latter is suggested by the phenomenon of ascending infection of the kidney from the urethra, and of the mammary gland through the galactophorous ducts. Furthermore in tuberculosis of the parotid gland the infection has generally been believed to occur through the mouth.

In regard to the frequency of tuberculosis of the salivary glands, Valude has expressed his opinion that this immunity is due to the bactericidal power of the saliva. But De Paoli proved that the saliva does not possess any such power. This latter author seeks to account for the immunity of these structures by peculiarities in their construction. The abundance of strong, young connective tissue in the salivary glands would tend to limit the extension of a tuberculous focus. It must be

remembered that the two cases of submaxillary tuberculosis were apparently primary and localized, the patients having been throughout the course of the disease in excellent health.

The diagnosis of this affection is necessarily difficult, and at the outset even impossible. Tuberculous adenitis would undoubtedly be first thought of in the presence of a submaxillary tumor; and next to this affection one would be most likely to think of some tumor of the submaxillary gland, especially a malignant growth. With these excluded, a cyst (ranula) would doubtless be suspected. Thus only by such exclusion could a diagnosis be reached.

The author now caused many animal experiments to be performed with a view to inducing submaxillary tuberculosis. His conclusions were as follows:

Tubercle may be produced in this structure, as in any other organ, but there appears to be a distinct tendency to fibrous transformation of the product.

In dogs and rabbits the disease is readily produced by either the blood or lymph route; but the reverse is true of infection through the ducts, because the flow of saliva offers a sufficient obstacle.

BUCCO-PHARYNGEAL TUBERCULOSIS.

Bernheim (*La tribune médicale*, Sept. 26, and Oct. 3, 1900) has prepared a short general digest upon this subject, in which he begins by stating that the bucco-pharyngeal and nasal mucosae are more exposed to contact with the bacilli of tuberculosis than are any other tissues of the body.

As the lining of the mouth and throat is extremely vascular and rich in lymphatics, inoculation in this locality ought to occur with frequency; unless some sort of protection were at hand. As a matter of fact the infrequency of primary tuberculosis in this area shows us that the latter enjoys a high degree of immunity.

Nevertheless cases of this sort occur more commonly than is generally believed. Irrespective of the fact that bacilli may possibly penetrate the buccal mucosa without causing lesions *in situ*, to be taken up later by the lymphatics, actual inoculation of the membrane is perhaps frequently overlooked. The physician, surgeon and dentist occasionally have their attention called to erosions or ulcers within the buccal

cavity which apparently refuse to heal, and this refractoriness is perhaps set down to the irritation of a particular tooth.

It is indeed a singular fact that tuberculous ulcers within the mouth,—lesions which must have existed perennially—, have never been described until the present century; and for a long period only secondary manifestations were recorded clinically, the bearers being in advanced pulmonary phthisis.

The obscurity and ignorance in which the subject of buccal tuberculosis was invested a generation ago, is best shown by the history of a case under the charge of Trelat in 1868. During that year Trelat saw at the Hôpital St. Louis in Paris a patient otherwise apparently sound, who was suffering from an ulcer of the tongue. He consulted Hardy who wavered in his diagnosis between syphilis and cancer. He then submitted the case to Broca who called the disease atypical glossitis and advised the actual cautery, which caused much improvement. The patient however, died suddenly not long afterward, and autopsy revealed double apical tuberculosis.

Through this experience Trelat was led to interest himself in the study of primary buccal tuberculosis. His description of the primary ulcer of the tongue has since been regarded as a classic. A considerable literature gradually sprang up on tuberculosis in the tongue and near by localities, and in 1886 Dr. Delavan of New York published a statistical article upon the subject.

From an analysis of the recorded material, it appeared, that out of 108 cases of nasal, buccal and pharyngeal tuberculosis, the tongue was affected 45 times, the pharynx 24, the mouth proper 22, the soft palate 8, nasal chambers 5, tonsils 4. Nearly all of these cases occurred in males.

The question as to the primitive or consecutive characters of these lesions was naturally very difficult to determine. Of the 45 cases of lingual tuberculosis 9 were held to be primary and 7 secondary; as for the rest no data are supplied.

One year later Bruneau published a thesis on buccal tuberculosis. He collected notes of 56 cases, 44 of which were in males.

The author now discusses primary buccal tuberculosis categorically. Not much is known as to the factors which render possible the inoculation of the tissues of the mouth by Koch's bacillus. Verneuil and others have seen the primary lesion appear in the site of a bite in the

tongue, while Ehrlich traced the accident to the prick of a fork. In numerous cases the irritation caused by the contact of a pipe or cigar appears to invite inoculation, just as happens often in epithelioma in the same localities. The abrasion caused by a projecting tooth has likewise furnished a site for the development of the disease; and Boulland recites a striking example of this nature.

Secondary buccal tuberculosis is much more frequently seen than the primary form. Morestin states that the child appears relatively exempt from this secondary localization because, since it does not expectorate, its bucco-pharyngeal mucosa is not exposed to sputum-infection.

While it is assumed that the latter mode of transmission most frequently obtains here, some cases undoubtedly originate from haematogenous infection

The author next discusses certain particular localizations of bucco-pharyngeal tuberculosis. In regard to the tongue three well-known forms of lesion are recognized, viz: the tuberculous ulcer, the tuberculous tumor and lingual lupus.

The ulcer of the tongue varies somewhat in its character at its debut, but eventually assumes a characteristic type. The borders and floor sufficiently identify it, the former being irregular, sinuous, and of the so-called "geographical" outline. The base is yellowish-white or grayish, and very uneven, suggesting the surface of a "relief-map." These ulcers do not readily bleed when touched, and thereby differ from those which accompany malignant growths. The circumference of these tuberculous lesions is not indurated, and the tongue retains its natural mobility. A red areola, however, is usually present, and within this zone may not be infrequently seen the "yellow points of Trelat," which when present are pathognomonic, representing as they do miliary tubercles.

Fereol has seen these yellow points in such abundance that he compared them as to number and arrangement with the stars in the milky way.

Accompanying these ulcers we usually find slight adenopathy in the sub-maxillary or carotid ganglia.

In regard to pain, it is often absent at the onset of the ulcerative process, but eventually appears, to cause great distress in connection with eating and speaking.

This form of tuberculous disease is very seldom primary; while actual

primary lesions may not be demonstrable at the time the history and appearance of the patient suggest tuberculosis.

This lesion of the tongue has an especially bad prognosis; and under no conditions is the out-look ever favorable. Left to itself the course of the ulcer is from bad to worse. It is sometimes possible to secure healing of the local affection, but the patient is almost certain to succumb of pulmonary tuberculosis.

The author briefly describes a personal case in a young woman, who had multiple lesions of the tongue and gums. The diagnosis of tuberculous ulcers was confirmed by the demonstration of Koch's bacillus in the affected tissues. The patient was placed upon a hygienic-dietetic treatment, with a simple mouth wash of salicylate of soda in aqueous solution. Under this management, her mouth was restored to its normal condition. At the time of writing her general condition was also satisfactory. Both her parents were dead of consumption, so that her chances of ultimate survival are very poor.

The other two varieties of lingual tuberculosis are extremely rare. The tumor or gumma is simply a cold abscess seated in the tongue, which presents for a time the characters of a neoplasm. This affection has been known to co-exist with a tuberculous ulcer, and would in most cases be associated with pulmonary phthisis. In the absence of any corroborative evidence, of tuberculosis, a diagnosis might be made by excluding the possibility of syphilis. Lupus of the tongue has been described by Telow and Darier. Clinically it does not belong in the same group with the preceding lesions, since its interest is chiefly local.

Bernheim also describes in detail tuberculous ulcers of the mucosa of the cheeks, gums, palate and tonsil, but the general characters of the lesions do not differ materially from those of the tongue already described. Zandy was able to recall some 26 cases of tuberculosis of the gums in a practice of twenty-five years. The disease is apt to extend from the gum to the alveolar process of the jaws. This author is convinced that lesions of this type may be primary, but as a general rule the appearance of tuberculosis in this locality indicates that the lungs are already involved in the disease; and in any case the prognosis is the same. Tuberculosis of the gums requires vigorous local treatment—the curette, lactic acid, etc.—to arrest the extension of the process to the bone.

In regard to the palate it was asserted as late as 1880 that this locality was practically immune to tuberculous infection. But several

years later this conclusion was generally recognized as erroneous. Numerous cases of tuberculosis of the palate have been placed on record, and during the present year Grocler has even limited a thesis (Paris, June) to a consideration of *tuberculous perforation of the palate*, based upon a study of eight cases. Of this number six were already phthisical, and in no case was the local tuberculous process limited to the palate, but was simply incidental to a general outbreak in the bucco-pharyngeal mucosa.

In his summary, Bernheim states that bucco-pharyngeal tuberculosis is not as rare as has been supposed; that it may be primary and remain localized, and that when a diagnosis is made in season, the local lesions admit of a permanent cure. This latter assertion should not cause us to ignore the frequently repeated statement in the body of his article to the effect that the general prognosis in these cases could hardly be worse.

TUBERCULOUS LARYNGITIS IN CHILDREN.

Brindel of Bordeaux (*Revue hebdom. de laryngologie, etc.*, Oct. 13, 1900) describes a condition which he terms ulcero-oedematous tuberculosis laryngitis of childhood. Up to 1896 he had seen three examples of this affection and published at the time a paper which had reference to these cases. Since that period he has encountered no fresh material, but he has studied the subject exhaustively in literature, and in virtue of the infrequency of the affection deems it worthy of a second paper.

In 1891 Rheindorff was able to find in literature but 20 scattered cases of tuberculous laryngitis in children. He concluded from his study that the younger the child the greater the immunity enjoyed. Numerous scattered references to this affection in childhood are to be met with in systematic treatises, but monographic treatment is found but rarely and nothing of importance has appeared within the past few years.

Brindel's first patient was a child aged $8\frac{1}{2}$ years. The parents and others nearly related were free from any suspicion of tuberculous taint, and the child himself had been well up to the age of 7 years, at which period he underwent an attack of typhoid fever. He never regained his usual health after this episode, and five or six months before consultation began to suffer from dysphagia.

At consultation, the left tonsil was found to be the seat of seven or

eight shallow ulcers each of which corresponded to a crypt; the base of the tongue, to the left, was similarly ulcerated; the left glosso-epiglottic fold was tumified and ulcerated, as was the epiglottis; finally, the arytenoid cartilages were tumified. There was bilateral cervical adenopathy, voluminous. The lungs appeared to be quite sound, but there was more than a suspicion that the tracheo-bronchial glands were enlarged, the physical signs pointing in this direction.

Brindel curetted the ulcerated tonsil and found Koch's bacillus in abundance.

The course of the disease was as follows: The cervical ganglia continued to enlarge, with resulting dyspnoea and increased dysphagia. On the right side the ganglia fused together, forming a solid mass from the lower jaw to the sternum. The trachea was displaced to the left. As a phlegmon was in progress, incisions were made, but evacuation of pus did not give a proportional degree of relief, and it was then ascertained that the arytenoids were not only additionally swollen but ulcerated as well. The patient rapidly succumbed to the cachexia, which had progressed with fearful rapidity.

Brindel is of the opinion that this case was one of primitive tuberculosis of the throat, and suggests that the typhoid fever so-called may have signalled the entrance into the system of the bacillus.

The other two cases occurred in children who were each thirteen years old. The local symptoms bore considerable resemblance to those of the first patient, but there was more evidence in cases II and III that the laryngeal lesions were consecutive to pulmonary implication.

Brindel concludes as follows: The child may (exceptionally), like the adult, suffer from the ulcero-odematous type of laryngeal tuberculosis. This affection, which is rapidly fatal, may be a primary manifestation of the disease. The element of tumefaction naturally tends to produce dysphagia.

HERNIAL TUBERCULOSIS.

Tachetti (*Annali di medicina navale*, Aug., Sept., 1900) reports a case with the above title from the clinic of Professor Bassini of Padua, as follows:

The patient was a soldier aged 22, whose father died of tuberculosis; there were, however, no other cases of this disease in the family, and the

patient's own health had always been good until one year before admission to the clinic, at which time he went through a mild attack of pleurisy of the left side. He was able to return to the artillery service at once, but soon after developed an inguinal hernia, for which he was sent to the Military Hospital at Milan for radical operation. When the sac was incised a clear liquid issued, the amount being increased by pressure on the abdomen. On examining the sac it was found to be thickened and studded with milary granulations which were evidently tubercles. The finger, introduced within the peritoneal cavity could detect a continuation of the tubercles along the parietal peritoneum. The omentum and intestine did not participate in the process. Histological examination confirmed the diagnosis.

The operation was a complete success despite the presence of local tuberculosis. When last heard from, the patient having left the military service, was at work in the fields. Dr. Rigoni, who had the opportunity of examining him, found the operation sac healthy, nor were there any symptoms, subjective or objective, to indicate that the patient had any malady in the abdomen or elsewhere.

With regard to the literature of hernial tuberculosis, Antonelli was able to collect notes of 74 cases, many of which (29) had never before been published. This work practically brings the subject up to date (*Revista Veneta di Scienze Mediche*, 1899). The affection is notably rare, for taking hernial cases as they occur in surgical clinics, a material of nearly a thousand cases of herniotomies failed to show a single instance of tuberculosis of a hernial sac (Panara).

Authors have distinguished two forms of tuberculosis, primary and secondary. In the first variety, the disease is located exclusively in the sac, from which it may or may not spread to the neighboring tissues. In the second variety, the sac is involved by continuity or contiguity from some other locality. The author's case could not, he says, have belonged to the latter category, because the patient was tuberculous before the formation of the hernia; it was equally impossible to regard it as secondary tuberculosis, because there was no evidence that it had extended from any of its neighboring tissues. The case may therefore be regarded as demonstrating the existence of a third variety of this affection, neither primary nor secondary, but contemporaneous. That is to say, the parts which formed the hernia must have been the seat of tubercles before the protrusion occurred. A primary hernial tubercu-

losis implies the fact that a hernia having occurred, the structures which compose it develop a primary focus of tuberculous disease. Cases of this sort are upon record. Again, secondary hernial tuberculosis similarly implies that a hernia originally free from disease becomes secondarily tuberculous by extension of the process from the peritoneum or other tissue, and the majority of cases are of this type.

The author's case having been operated on promptly after recognition of the hernia, and the lesions being too far advanced to have developed in the few days which intervened, the only conclusion justified by the facts, is that the parietal peritoneum at that point was tuberculous when the hernia first occurred.

TUBERCULOSIS OF THE BLADDER.

Casper has had personal experience in the care of thirty-five cases of vesical tuberculosis. Because of the lack of harmony in the opinions of various authorities upon the subject of urogenital tuberculosis—and especially in reference to the question of primitive and consecutive foci—he regards any careful analysis of new material as a contribution of value to our knowledge of a subject which is of almost equal interest to physician and surgeon; for it is now well known that cases of supposed tuberculous cystitis may actually represent a primary infection of the kidney.

In Casper's series of cases of tuberculosis of the bladder, the kidneys were also implicated in 40 per cent. In a considerable number of cases the generative organs participated in the disease, while associations with tuberculosis of the lungs, joints and skin (lupus) were observed. In three cases the vesical lesions were part of an eruption of general tuberculosis, while again in three cases the bladder was the sole organ involved.

In this series of cases, which is reported in the *Deutsch. med. Wochenschrift*, Oct. 11 and 18, 1900, the author refers only to out-spoken tuberculosis of the bladder, no account being taken of latent cases.

It appears that but three of the 35 cases were primary; and of this number two were apparently determined by a previous gonorrhoeal cystitis, while the etiology in the third case was wholly obscure.

Of the 14 cases in which the kidney was simultaneously affected, at least 11 appeared to be examples of primary tuberculosis of the kidney

with secondary implication of the bladder. The remaining 3 cases were seemingly instances of an ascent of the disease from the bladder to the kidney.

In ten instances in which the urinary and genital organs were both involved, the latter structures appear to have been first affected in the majority of cases; and in five instances in which the bladder and lungs were alike tuberculous, the pulmonary localization was uniformly the oldest.

In none of the 35 cases of vesical tuberculosis was there any evidence to show that the disease had been transmitted by coitus.

Gonorrhoea appears to play a not inconsiderable role in the production of tuberculous affections of the urogenital apparatus. Klebs even asserts that the most acute type of miliary tuberculosis has been known to follow closely upon an attack of gonorrhoeal urethritis and prostatic. Simmonds states that in individuals of strong tuberculous predisposition, an attack of gonorrhoea is likely to set up urogenital tuberculosis. As a matter of fact, one-third of our present author's cases of vesical tuberculosis had suffered at some time in their lives from gonorrhoea; but as the interval between the two diseases was not recorded, no use can be made of these data. It appears safe to conclude that gonorrhoea fulfills the role of traumatism in these cases. As a trauma may arouse to local activity a latent syphilis, it may also produce an analogous effect in latent tuberculosis. From the practical side, Simmond's advice is to carefully watch over the out-come of every case of gonorrhoea occurring in a person with a marked tendency to tuberculosis.

In regard to the diagnosis of tuberculous cystitis we should expect to find the bacillus in the urine in about 50 per cent. of cases. We must bear in mind the fact that the smegma bacillus may occur in the urine; and of the many methods recommended to distinguish this germ from Koch's bacillus, the most certain is probably that which has reference to the time required to produce cultures. The smegma bacillus will grow on blood serum and glycerin-agar in 24 hours; while the tubercle bacillus requires in these media at least 10 days for development.

In a case of suspected vesical tuberculosis in which bacilli cannot be detected in the urine, diagnosis is often very difficult. We may test the patient with tuberculin or inoculate an experiment-animal with the urinary sediment, but under these circumstances negative results cannot be regarded as conclusive. We then have to depend on clinical

phenomena, some of which are, when present, quite characteristic. Thus, extreme painful tenesmus, not controlled by the strongest narcotics and evidence of a contracted bladder with small lumen point to vesical tuberculosis. The author believes that this greatly diminished capacity of the bladder and corresponding marked thickening of the walls are not always due to a process of sclerosis following chronic cystitis, but are sometimes better explained by conceiving them to represent a cysto-spasm. The originally diseased and contracted bladder is a common feature in the ascending type of cystitis, while cysto-spasm is rather seen in connection with descending tuberculosis which usually involves only the superficial portion of the lining membrane of the organ and does not lead to deep structural alterations.

The great value which cystoscopy should ordinarily possess in this affection is offset by the fact that owing to its diminished capacity the organ cannot well be sufficiently distended to use the cystoscope. This diagnostic resource is distinctly meddlesome, aggravates the local condition and should never be resorted to unless absolutely necessary.

While there are no characteristic cystoscopic pictures of vesical tuberculosis, this method of research may be able to determine whether the disease is of the ascending or descending type. In the latter case the lesions appear to have been propagated from the ureteral orifices.

Under the head of treatment there are few general maxims of certain import to inculcate. The better course is probably to treat the malady as a purely constitutional affection, and order the same general regimen which the pulmonary consumptive pursues.

As for local measures some practitioners forego the use of all surgical measures. These bladders cannot be irrigated. Lactic acid, sublimate, and other bactericides and alteratives may be instilled into the bladder in small quantities. The pain caused by the acid, even in 20 per cent. strength, is so severe that Casper uses sublimate only, in strength of 1-5000 or 1-10,000. The instillations should not be practiced oftener than once or twice a week. Even sublimate thus used occasionally requires to be followed by morphine. In certain cases the mercurial salt exercises a marvelous anodyne effect upon the disease after the period of reaction has expired. The sublimate treatment should be reserved for such cases as exhibit constant and unbearable tenesmus, and if it does not lead to relief after three or four trials its use should be discontinued. In the milder forms the author appears to advise,

for the vesical symptoms proper, nothing beyond a few remedies to act upon the urine, such as creosotal and carbonate of guaiacol; others have recommended enrotropin, ichthyol, etc. Some practitioners use little more than narcotics.

In cases in which sublimate instillations (so successful in the hands of Guyon and Casper) are inadequate to relieve the intense tenesmus, there is nothing left to do but perform cystotomy and curette the lesions.

PRIMARY TUBERCULOSIS OF THE VAGINA.

Jorfida, assistant of Professor Tricomi of Padua, before proceeding with the report of a personal case of this affection, reproduces from literature a series of interesting observations of similar character. (*Reforma medica*, Oct, 17, 18 and 19, 1900.)

Thus Thompson (1872) once encountered an impervious hymen, with retention of nearly a quart of fetid liquid, originally in part of menstrual origin. In this case, the vagina and vaginal portion of the cervix were found studded with tubercles.

Zwiegbaum, in 1887, reported a case of tuberculosis of the vulva, vagina and cervix. Several ulcers with sinuous margins were seated in the posterior wall of the vagina. They were characterized by a hard base and thick, grayish discharge. Ulceration had extended outward and had completely destroyed the left labium minus.

In a case of Kuttner's the vulva had become infected from tuberculous inguinal glands by direct extension. The labium majus first became thickened and then began to ulcerate. The process spread across the anterior commissure of the vulva to the opposite labium majus, clitoris, etc.

Cases like the foregoing, however interesting, would be considered as examples of secondary tuberculosis as far as the vagina is concerned, because the primary focus was seated in the cervix, inguinal glands, etc. Purely primary tuberculosis of the vagina has, however, been recorded by Demme and others. Demme has described cases in infants, in which the lesions were seated at the ostium vaginae. The primary character of the lesions was further shown by the fact that these cases underwent radical cure.

Schenk also described a case of primary tuberculosis of the clitoris which extended incidentally into the urethra. The patient, a child aged

four years, was cured by resection of the urethra and some of the anterior wall of the vagina.

De Paoli has reported no less than five personal cases, one of which however, was evidently secondary. Two of the observations are of especial interest, because the husbands apparently became infected from their wives through sexual relations. No mention is made of any primary lesion in the male urethra, but one husband developed tuberculosis of the inguinal glands while the other was attacked by tuberculosis of the testicle and died shortly afterwards of pulmonary tuberculosis.

The author's own case occurred in a peasant aged 23, married. No family history of tubercle. Patient was well up to the time of her first labor which left her with a tear of the perineum, severe enough to keep her in bed for two weeks. She was free from symptoms during the next two months, at the end of which time she began to suffer from a burning sensation in the genitals which became the occasion of painful micturition. A yellowish discharge accompanied these sensations, and while at first scanty, soon became copious enough to require the wearing of a napkin.

After some 20 days from the beginning of the discharge, an evening elevation of temperature became manifest, while adenopathy appeared in the inguino-urinal region of both sides. Still later it was noted that the right labium majus had begun to increase in size.

A general physical examination made at this time appeared to show that aside from the local disturbance the patient was physically sound in every respect, although there was some evidence of anaemia.

Large swellings, measuring three fingers' breadths by five, occupied the groins, and were found by palpation to be made up of lymph ganglia of various sizes, some of which structures appeared to have undergone softening. On separating the labia majora, the vulva and inferior segment of the vagina were seen to be covered with an abundant yellowish secretion, which when removed exposed to view a number of ulcers which appeared to occur with special frequency in the posterior commissure of the vulva and posterior wall of the vagina. The cervix and vault of the vagina were still in a healthy state. The majority of these ulcers were small; here and there, by confluence apparently, considerable size had been attained. The characters presented by these lesions when the latter were of sufficient size, the anfractuons and sharply cut borders, the grayish, lardaceous base, etc., were such as usually accompany tubercu-

lous ulceration. Microscopical examination of the secretions clearly showed the presence of Koch's bacillus.

The free use of an antiseptic douche did not prevent the evening rise of temperature, nor did the ulcers exhibit any tendency to heal. The condition of the inguinal glands also appeared to require active interference. The latter were first extirpated, and after healing had resulted, the vulvo-vaginal ulcers were thoroughly curetted and cauterized with the Paequelin, after tamponning the upper part of the vagina.

The patient made a complete recovery.

TUBERCULOSIS AND MARRIAGE.

Gerhardt (*Zeitschrift für Tuberkulose und Heilstättenwesen*, September, 1900) discusses the responsibility of the physician in regard to the betrothal and marriage of tuberculous individuals; and states that while some medical men oppose marriage among these individuals under all circumstances, others believe that conditions might and do exist which may justify such marriage by insuring better care and nursing.

If marriage takes place a tuberculous wife runs a greater risk than a tuberculous husband, because of the prejudicial effects of pregnancy, parturition and lactation upon the course of the disease. In 1850 Grisolle took up the consideration of this subject, being perhaps the first author to publish definite data, his material comprising the subsequent histories of 27 tuberculous women after marriage and childbirth. Twelve of these women who were past the first stage of consumption, lived on an average 4 months each after delivery. Ten women in the first stage or before its full development, were made worse in 2 cases, the disease pursued its course unchanged in 3 cases, while the other five actually seemed benefitted by childbirth.

After the publication of Grisolle's paper a considerable literature sprang up on the relationship of tuberculosis to matrimony. One of the most commendable and at the same time little known studies on one phase of this subject is that of Sir Hermann Weber, who followed up the fate of 68 tuberculous individuals who had married healthy men or women. Of the 29 sound males who married the consumptive females, a few became tuberculous; but of 39 healthy women who married consumptive men, no less than 18 became infected and the disease appeared to run its course in these cases with unusual rapidity.

Hartsen once wrote a paper (*Virchow's Arch.*, Bd. 49) in which he advocated the ground that the tuberculous should be allowed to marry.

Virchow himself called attention to the fact that tuberculous prostatitis not infrequently developed in consumptive husbands, while childbirth often left the wife with tuberculous endometritis. Young men of phthisical stock often perish within the first year after marriage. The physician should explain the dangers of wedlock to those who look forward to it, and should counsel them to remain single, while at the same time refraining from usurping the patient's innate right to act on his or her own judgment.

One of the most recent writers on this subject is Van Ysendyck, who, while dissuading from marriage those actually tuberculous, believes in encouraging those who have recovered from the disease to wed, for the greater care and greater regularity in habits which are likely to accrue. He even thinks it wise for a person to marry who has merely undergone considerable improvement. But those who are actively tuberculous or who are even candidates for the disease he would dissuade from marriage. He appears to think that one who has been able to withstand the disease, wholly or in part, should be allowed to marry to save his life; while the individual with beginning phthisis, whose numerical chance for withstanding the disease is poor, and whose vitality is an unknown quantity, would probably become worse through marriage, to say nothing of the dangers to his wife and progeny.

Gerhardt now relates a case which he saw early in his practice, and which made a deep impression on him. A physician who had apparently recovered from tuberculosis years before, married a young woman of florid health and sound ancestry. A child was born and then, but little more than a year after his marriage the doctor died of a recrudescence of his old disease. One year later still, the wife perished of pulmonary phthisis, and after several years more the child succumbed to tuberculous meningitis.

Posner demonstrated the fact that no less than 30 per cent. of the cadavers of the tuberculous show urogenital lesions. Gonorrhoeal epididymitis has a special tendency to pass into the tuberculous form. Facts like these show how readily the disease might be conveyed to the female by the male.

Ellinger believed that prolonged lactation would protect the mother

from consumption, but the physician now-a-days takes the opposite view, while also forbidding nursing for the child's sake.

Gerhardt would insist that the apparently cured individual should wait at least a year before marrying, for many "recoveries" are only temporary arrests of the tuberculous disease.

It is a well-known fact that a tuberculous man has as a rule a marked degree of sexual desire. Pollutions are not uncommon, but Gerhardt has often treated these cases successfully with lupulin and camphor, and also with increasing doses of digitalis.

Because of the activity of his sexual propensities the phthisical subject often contracts gonorrhoea or syphilis. In the later case the mercurial treatment necessary to cure the syphilis does not prejudicially influence the course of the tuberculosis. In the case of the association of the latter disease with gonorrhoea, the patient, must wear a suspensory, and avoid irritating injections, with a view of especially preventing epididymitis.

TUBERCULOSIS AND PREGNANCY.

De Marini, who is assistant to Professor Bossi, University of Novara, contributes an article with the above title for *La Rassegna d'Ostericia e Ginecologia*, April, 1900.

It is not only important, he says, to determine the effect of pregnancy upon consumption, but we ought also to learn what effects consumption has on the course of pregnancy and on the fetus.

Twenty cases of the association of tuberculosis and pregnancy are analysed and tabulated. In these cases, however, pregnancy was artificially terminated, so that they do not fully illustrate the subject of the reciprocal influence of the two conditions, but merely the management of the association.

From his own experience and the findings of others, De Marini states that as a general rule, pregnancy exerts an unfavorable influence upon the consumptive. The nausea and vomiting of pregnancy favor inanition, the enlarged uterus tends to favor pulmonary congestion, interference with the circulation disposes the patient to embolism, etc.

Certain forms of tuberculosis, however, exert much less influence on the gravid state; these compose the so-called fibroid phthisis, and also certain cases in which the tuberculous foci are sharply localized. It

5. Acute polyarthritis in the course of pulmonary tuberculosis. This case appears to be the only one given in which joint disease was associated with pulmonary tuberculosis.

The balance of the article is largely surgical in character. In summing up, the author cites Berard and Destot (Surgical Congress, 1897) on the subject of the deforming polyarthritides of tuberculous nature. These authors make three distinct types: 1. The patients presenting this disease are of the tuberculous diathesis only. 2. The polyarthritis is preceded by pulmonary tuberculosis. 3. It is preceded by an ordinary tuberculous joint, such as white swelling of the knee.

The author suggests that in all suspicious affections of the joints, we should test for the presence of tuberculosis by the serum-reaction. Whenever cases of arthropathy do not respond to the classical treatment for ordinary rheumatism, (sodium salicylate, antipyrin, etc.), they should be regarded as specific.

In respect to the treatment of tuberculous rheumatism, there should be some means to cut short the initial stage and prevent the formation of destructive or crippling lesions, to say nothing of the onward march of the tuberculous factor in the organism.

Our general resources must be made up of air, rest and over-feeding.

Locally massage, revulsion, immobilization, come into play according to the nature and degree of the malady. As a specific, almost, for these lesions, Poncet recommends the sun-bath, as described in Millon's thesis, Lyon, 1899.

PRIMARY TUBERCULOUS ULCER OF THE SKIN OF THE PENIS.

Tschlenoff (*Archiv für Dermatologie und Syphilis*, January, 1901) speaks of the infrequency with which this affection has been noted, which, however, does not signify that the lesion is absolutely rare. A search into literature reveals the fact that nearly thirty authors have written upon this subject, but of the cases reported the majority were secondary to tuberculosis elsewhere in the body. By the term secondary the author includes not only cases of haematogenous transmission but others in which auto-inoculation figured. There is quite a series of the latter on record in which the penis became infected in conjunction with urogenital tuberculosis.

Excluding all these cases of secondary infection, together with inoculations of newborn infants in connection with the ritual circumcision, the number of cases of tuberculosis of the penis is extremely small.

Pospelow saw, he thinks, an undoubted case in his private practice which is herewith reported for the first time by the author. The patient was a man aged 43 years, with good family and personal history; his wife was free from disease, but five of their six children died early in life, and there was a history of one abortion. For some time the patient had been irregular in his habits, using alcoholics habitually. A thorough investigation showed a considerable disposition to neurasthenia. No history of evidences of syphilis could be obtained, the patient owning up, however, to gonorrhoea and chancroids. Four months before consultation an ulcer appeared upon the penis. It began as a mere excoriation which refused to heal and slowly increased in size. Beginning in the prepuce the disease extended upon the glands causing a deep loss of substance. The wall of this ulcer was steep, elevated, very firm, irregular in outline which was dentate and as if gnawed in places. The hard uneven floor of the lesion was covered with a sero-purulent secretion. No miliary nodules could be seen.

This lesion was destitute of pain and was uncomplicated with lymphangitis or adenopathy.

In making a diagnosis of this case hard and soft chancre could be at once excluded, but the possibility of gumma or epithelioma required elimination. Under potassic iodide no improvement was observed and the diagnosis between epithelioma and tuberculosis was settled by submitting an excised portion of the growth to the microscope. Not only did the specimen present the histological characters of tubercle, but tubercle bacilli were found. An operation was proposed to the patient but the latter disappeared and his fate is unknown.

The apparently sound health of the patient, the author thinks, justified the diagnosis of a primary tuberculous lesion. Infection could not have taken place from tuberculosis of the urogenital apparatus, nor had there been any exposure analogous to circumcision. The case therefore, seems to be a class of itself, and its origin is involved in much obscurity.

The question as to the possibility of infection by coitus requires discussion here. The majority of authors believe in such a possibility, although an author like Guyon disputes the claim that tuberculosis is ever transmitted in this way.

Dobroklonsky, an author who has devoted much attention to this subject, sums up the evidence which points to the genital method of transmission as follows:

is in cases of these types that we may even see apparent benefit from the association of the two conditions. It is under these circumstances that crowding of the lung-tissue by the ascending uterus may produce such an effect of expansion in the air-cells during inspiration, that the effect upon the still intact pulmonary structure may be salutary. However, in these cases of circumscribed phthisis the patient is exposed to other dangers; and it is not uncommon to see women who have been in a satisfactory condition during the whole course of gestation, succumb in a few days after delivery to acute infection of the lungs. Hence the fibroid is the only form of phthisis not prejudiced by the state of pregnancy and the puerperium.

On the other hand tuberculosis exercises a pernicious influence upon the course of pregnancy and the fetus. It often causes abortion or premature delivery. If the child is safely born, it is not as well developed as the child of a healthy woman, being weak, fragile and especially disposed to contract tuberculosis.

In 1891 Martin began to agitate the question of the feasibility and expediency of interrupting pregnancy in a tuberculous woman. Maragliano and Bossi were the first to occupy themselves with this subject in Italy.

The conclusions of the author, which are presumably those of Bossi himself, are as follows:

1. Pregnancy and especially parturition, (by reason of the lost blood and impoverished energy), have a pernicious effect on tuberculosis.
2. Tuberculosis has a disturbing action on the course of pregnancy and the fetus.
3. If the fetus survives, a tuberculous unit is added to society.
4. Intervention should be by the most rapid and least laborious method. Krause's method of terminating pregnancy is advised where urgency is not required, while in the opposite case the Bossi method is employed.

Some of the results of treatment are as follows:

Case I. Woman 8 months pregnant. Pulmonary consumption. General condition very bad. Pregnancy interrupted by the Bossi method. Death 30 days after delivery.

Case III. Consumptive woman, 5 months pregnant. Pregnancy interrupted by the Krause-Bossi method. Forty days later, genitals found in normal condition. Slight improvement in pulmonary symptoms.

Case V. Woman three months pregnant. Pulmonary tuberculosis. General condition very poor. Pregnancy interrupted by the Bossi method. During the puerperium there was notable improvement in the pulmonary symptoms. Four months later, condition relatively good.

The preceding cases were recorded early in the nineties. Turning to those which occurred more recently, we find that the Krause method is the one principally employed. Hence we infer that interference is practiced earlier in the pregnancy, when possible, and that a more conservative method of intervention may be used for that reason.

With regard to the technique of intervention, it may be stated that the Bossi method consists essentially in the use of the graduated mechanical dilators introduced by him into obstetrical practice. In his published descriptions of these dilators, Bossi states that by their use he can open the cervix in 15 or 20 minutes. Bossi's method may also be employed in connection with the ordinary conservative method, or may if necessary entirely replace it.

CONGENITAL TUBERCULOSIS.

Cases of congenital tuberculosis have recently been reported in both mankind and the calf.

In the *Zeitschrift für Fleisch- und Milchhygiene*, April, 1900, Messner, city veterinarian at Carlsbad, reports two cases of this affection in cattle. The first was a female aged 14 days. Nutrition moderately good. Location of the lesions, bronchial and mesenteric glands and especially the portal glands. The other animal was a male calf aged 14 days, condition much like that of the first case, especially with regard to the principal focus in the portal glands. The two calves were presumable the twin offspring of a tuberculous cow, although this could not be determined beyond a doubt. The age of the animals, character and distribution of lesions, pointed clearly to an infection *in utero* by means of the umbilical veins. The calcification found in the enormously enlarged portal glands appeared to show that these structures were first attacked.

In regard to the human species, Dr. Tyle reports a case of congenital tuberculosis in the *Philadelphia Medical Journal*, August 4, 1900. The mother was a colored woman, far gone in phthisis, insomuch that it was regarded as a marvel that she could carry a child at all. Her disease

dated back about two years; she had already borne one child since she had become tuberculous.

The mother died two days after the present labor. Autopsy showed extensive tuberculosis of lungs and intestines.

The child weighed at birth but $3\frac{1}{2}$ pounds, and was weak. Nevertheless it gained weight for the first two months, after which it began to lose. At first its temperature was sub-normal, while 12 days before death, after a period of slight rise, it developed hyperpyrexia. The curve was characteristic of tuberculosis.

The terminal symptoms are not described, but the autopsy revealed tuberculosis of the lungs, liver, spleen, kidneys and bronchial glands. The lesions were of the same age, indicating their hematogenous origin. The child had not been exposed to contagion from the mother, nor any other tuberculous subject or substance. The author therefore concludes that the source of the infant's disease must have been the maternal blood.

HEREDITY OF TUBERCULOSIS.

Chantemesse is publishing a serial article (*Le Progres Médical*, Oct. 27, 1900) upon the entire subject of heredity in disease. From his superior point of view, his knowledge of comparative heredity should make his remarks in the inheritance of tuberculosis of peculiar interest.

As is the case in syphilis, so also in tuberculosis do we see the operation of a two-fold heredity. In one case the living virus, or germ of the disease is handed down from the parent to the child before its birth; while in the other case there is an intoxication of the embryo by the specific poison of the disease, the tuberculous toxine, imbibed from the tissues of the parents, the deleterious action of which is expressed by defective development of the offspring.

In regard to the subject of conceptional transmission, it is well known that the syphilitic father can propagate his disease to his offspring by the semen, but we have no parallel demonstration for tuberculosis. Such transmission of the latter disease would seem to depend upon the prolonged sojourn of the tubercle bacillus in the tissues of the offspring without the assertion of its peculiar activities. In view of the essentially necrotizing action of this germ it is not easy to conceive of the possibility of its remaining quiescent during the long period of development of the

human embryo. But this scepticism is of course based upon theory alone.

Heape, the English scientist, has succeeded in breeding from a Belgian rabbit eggs taken from the uterus of a Danish rabbit; so that when the litter was born it consisted of five Belgian and two Danish rabbits. This experiment must necessarily open up a new vista in regard to the possibilities of conception, for the mother apparently exerted no influence of heredity in the transplanted ova.

The subject of maternal transmission offers no such difficulties, although the direct infection of the ovum by the bacillus is difficult to demonstrate in the presence of the possibility of placental transmission. Concerning this latter phase of heredity, there is of course no doubt whatever of its existence. It is a matter of complete demonstration that the bacilliferous blood of the mother in general miliary tuberculosis may traverse the placenta and lead to general tuberculosis in the fetus. Yet during long years of observation, there have been placed on record but twenty cases of this transmission in the human species, and about sixty cases in the bovine race. This phase of heredity is then a mere pathological curiosity, for thousands of tuberculous mothers continue to give birth to non-tuberculous offspring—i. e. to infants who are completely free from any lesions, however slight, presenting evidences of tubercle.

But Landouzy and H. Martin demonstrated that congenital tuberculosis may exist *without* anatomical alterations as a pure bacillaemia; while a number of other authors have reported analogous cases in both mankind and animals. The tuberculin test has been successfully employed in the newly born of tuberculous parents, itself apparently indemnified from the disease. This transmission of the bacillus without collateral evidence of disease, and with nothing more than a suspicion of microscopic lesions too small to discover and too insignificant to disturb the equilibrium of health opens up a new possibility, viz: that of the conferring of immunity upon its offspring by the tuberculous parent.

It is certainly true that in the vast majority of cases the new-born of tuberculous mothers appear to be protected against successful attack by the bacillus, and does not succumb unless the latter is present in great numbers. In any case congenital transmission, either with or without microscopical lesions, is essentially very rare.

One more phase of inherited tuberculosis remains to be mentioned,

viz: the intoxication of the embryo by tuberculous toxins and the diathetic dystrophy thus engendered.

This phase is still in the doctrinal stage and is inferred rather than demonstrated. The evidences of such inheritance are enumerated by Landouzy as follows: increase of mortality in the offspring of the tuberculous; defective height and weight of such children at birth; tendency to congenital debility and marasmus during the first months of life. These phenomena represent the so called atypical heredity.

ETIOLOGY OF ACUTE MILIARY TUBERCULOSIS.

Cornet has contributed a separate study upon the subject of acute miliary tuberculosis to *Nothnagel's Handbuch d. spec. Pathologie und Therapie*; for his main work on tuberculosis, which constitutes an entire volume of the same encyclopaedia, does not comprise a consideration of acute general infection by Koch's bacillus.

Under the head of etiology, Cornet points out that infection in this disease necessarily occurs from a pre-existing local focus, which may be latent. From such a focus bacilli in vast numbers find an entrance into the blood-stream.

As a matter of fact autopsies by no means always reveal the presence of such foci, but we know that the latter are at times so minute as to escape detection. They have, for example, been recognized in lymph-ganglia no larger than a pin-head.

It is very difficult to explain why such intensely virulent matter, so often present somewhere in the organism, does not more frequently cause general infection. Clearly there must be some special reason for this immunity. Pathologists are quite unanimous in accepting the theory of Weigert that acute miliary tuberculosis presupposes a contamination of the blood from a tuberculous deposit in the wall of some vessel—artery, vein or thoracic duct.

As a matter of fact vascular tubercles have thus far only been found in subjects with acute miliary tuberculosis. The converse, however, is not quite true, for in the acute general infection we do not always find vascular tubercles.

There are therefore other methods by which the blood may be flooded with bacilli, although it is possible that specific lesions of the vessels may occasionally be overlooked.

The disparity often found between a minute primary focus and the extensive general dissemination of the disease cause one to inquire as to the likelihood of the propagation of bacilli within the blood. Cornet says simply that such a mode of increase has not been proven.

With regard to the manner in which vascular tuberculosis originates, the vessel may be attacked from either without or within. In the former case a peri-vascular lesion is first produced which may extend through the vascular wall to the intima. The irritating action of the toxins produced *in loco* causes an irritation of the coats of the vessel with resulting thickening. This in turn leads to thrombosis and obliteration of the vessel. Thus far the process appears to be conservative, as a natural barrier is formed toward the entrance of bacilli into the blood-current. But certain accidents may occur which favor infection of the blood. Thus thrombosis may fail to take place, so that bacilli may pass into the vascular lumen. Again, the increase of blood-pressure which results from the diminished calibre of the vessel may cause the latter to rupture at a locality where the bacilli abound.

While there is no doubt that the vascular wall may first be attacked from within, this very fact is evidence that the virulent bacilli must have already gained entrance into the blood, so that lesions of this origin cannot be regarded as necessarily primary.

It has been stated that tuberculosis of the vessels is not the sole explanation of the production of acute miliary tuberculosis, although the latter appears certain to result when the intima of the vessels is attacked. Other familiar modes are known to occur to a certain extent. In the destruction of the tissue which accompanies the formation of a tuberculous cavity, a blood-vessel may be eroded with resulting penetration of bacilli into the blood-stream. Again a small vessel traversing an infected bronchial gland which swarms with bacilli, may be so closely invested with hosts of the latter, that as viewed under the microscope, the micro-organisms appear to have been forced bodily through the thin vascular wall.

The vessels which are most prone to bacillary attack and penetration comprise in order of frequency the pulmonary veins, thoracic duct, vena azygos (infected from retroperitoneal glands), external jugular vein, cervical glands, etc., and small arteries and veins, those which traverse the bronchial glands.

The immediate consequences of penetration of bacilli into the circu-

lation depend largely upon the fact that the great veins and thoracic duct are most commonly attacked; so that the micro-organisms pass at once into the lungs, although a proportional amount gain the general circulation. When entrance is through the wall of the pulmonary vein, the systemic circulation receives the full brunt of the invasion.

Cornet states that we are unable to account for the paradox that *acute* miliary tuberculosis is relatively uncommon in the evolution of ordinary pulmonary phthisis. This fact is in some way bound up with the greater frequency of the general infection in childhood. *Chronic* miliary tuberculosis is of course common enough as a result of phthisis, but the acute and generalized infection appears to depend largely on quantities peculiar to the child-organism—delicate vascular walls, diminished tendency to thrombosis because of rapid circulation, which also favors generalization rather than local stagnation.

With regard to favoring factors other than childhood, any agency which might forcibly assist the bacillus in getting through the vascular wall should be mentioned. Such affections as measles and whooping cough may light up a latent glandular tuberculosis into general infection. The cough which accompanies these diseases should also be regarded as a possible mechanical agency in producing rupture within an infected gland. The claim that the reaction caused by tuberculin injections can give rise to general infection has never been proven. In 420 personal cases in which tuberculin was used, Cornet never saw such a result.

Aside from acute infectious diseases and trauma in the widest sense of the word, the states of pregnancy and the puerperium appear to favor the development of acute miliary tuberculosis. As far as surgical intervention is concerned the only operations which have been known to result in general infection to any extent are those concerned with tuberculous bones and joints and fistula in ano. Benda, who has interested himself especially in *intravascular* tuberculosis states that in acute miliary infection after bone operations, the bacilli enter the circulation slowly and do not at first give rise to general tuberculosis. The microbes few in number, tend to settle at some one or more localities and set up intravascular tuberculous foci. From these deposits, the entire blood mass is later infected.

General infection is known to follow at times the rapid resolution and absorption of tuberculous glands, pleuritic exudates, etc.

TUBERCULOUS INFECTION BY THE NASAL ROUTE.

Liaras has recently published upon this subject a monograph entitled "*Contribution a l'etude de l'infection tuberculeuse par la voie nasale*" (Paris et Bordeaux, 1899). The article has an essentially bacteriological tenor, and the inaugural chapter is principally historical in scope. The study of intranasal bacteriology as a whole antedated by some years the demonstration of tubercle bacilli in the nasal secretions.

Straus appears to be entitled to the credit of attracting the attention of the profession to the fact that the bacillus of tuberculosis may be occasionally found in the nasal chambers. In his article on this subject, published in 1894, he tells us that he was led to this study by the results obtained by Cornet in regard to tuberculous dust. If the air in the rooms inhabited by consumptives contained virulent bacilli floating and settling like other dust particles, Straus reasoned that such germs ought to be found in the nasal chambers. The results obtained by him in a series of experiments in this direction showed that the nasal mucus of attendants and others exposed to tuberculous dust contained Koch's bacillus in about one-third of the cases examined.

Liaras, in taking up the problem of intranasal infection in tuberculosis, began by an endeavor to verify Straus's experiments. He inoculated guinea-pigs with the nasal mucus of 18 individuals from the Hôpital Saint-Andre, but did not secure a single positive result. These subjects should in theory have been exposed to tuberculous dust, and some of them ought to have had bacilli in the nasal chambers. The inference was that the bacilli if present at all in the nose, must have been in a non-virulent condition. Liaras' negative results agree with the findings of most of those who have sought to repeat Straus's experiments.

To attack the problem after a different fashion, Liaras takes up a moot point, viz: the possible intranasal origin of lupus of the face. As far back as 1896 Audry declared that in this form of local tuberculosis the nasal mucosa was invariably implicated in the same process. One year later Meneau and Frèche advanced the claim that lupus of the face necessarily originates within the nose. Other observers connect tuberculous dacryocystitis with lupus of the face, and the former affection may be conceived of as either preceding or succeeding to the intranasal lesions. Arnozan sees a direct connection between dacryocystitis and

lupus of the face without the intermediation of the nasal fossae; the pus from the inflamed lachrymal sac, escaping either from the puncta lachrymalia or through an artificial opening may, he thinks, directly inoculate the cheek.

Liaras now studied the nasal discharges in individuals representing four types of cases.

The first type was represented by individuals with lupus of the face with which was associated a purulent coryza. A great variety of flora was found in the pus from the nose—staphylococci, streptococci, diplococci, pneumococci, etc., etc.—but not a solitary example of Koch's bacillus could be found. On the other hand, in a case of lupus of the left inferior turbinate associated with right-sided dacryocystitis there was no nasal discharge whatever. Not enough nasal mucus could be collected to sow for a culture; yet some of the debris of the turbinated bone gave a positive result in the animal experiment.

The second type of case examined consisted of purulent atrophying rhinitis in scrofulous subjects. The individuals in this group were mostly children. The coryza was associated in some of the cases with strumous eczema, adenitis, etc. In this type the findings were exactly similar to those of the first group, viz: abundant flora of various pathogenic microorganisms, but no tubercle bacilli.

The third type studied consisted of purulent coryza in otherwise healthy individuals, and the results in regard to tubercle bacilli were, as might have been expected, quite negative.

The fourth and last type of case examined consisted of purulent atrophying coryza in tuberculous subjects. The frankly tuberculous lesions were pulmonary, laryngeal, etc., etc. Even under such conditions as were here encountered, the nasal mucus discharge appeared to be quite free from tubercle bacilli.

Liaras is therefore forced to conclude that the nasal apparatus and secretions, even when diseased, are capable of exercising a protecting influence over the general organism. Ingals of America advanced the view, in 1897, that nasal catarrh rather prevents than favors the development of pulmonary consumption. It seemed, however, very probable that atrophying coryza, which practically destroys the nasal apparatus, may in some way favor the development of tuberculosis further down in the air passages. The final research of Liaras was to attempt to throw some light upon this matter. He investigated 52 cases of atrophy-

ing, ozenous coryza, of prolonged duration, in individuals of both sexes and different ages; yet out of this material he was able to find but two well-marked consumptives, and three suspects.

The author is therefore obliged to confess that even in the most severe affections of the nose not actually tuberculous, the nasal mucus is sterile as far as Koch's bacillus is concerned, and that the protective power furnished by the nose is not extinguished even when the mucosa is practically destroyed.

The author's own conclusions are as follows: The nasal cavity, while not completely sterile, is a defender of the organism against microbean invasion by the aerial route. The bacillus of tuberculosis is not to be found in the normal nose when the latter has been exposed to tuberculous dust; nor in the nasal discharge which precedes the appearance of lupus of the face; nor in the nasal discharge which accompanies scrofulous and tuberculous affections. Nor is there any clinical evidence to show that atrophying rhinitis predisposes to pulmonary or laryngeal phthisis.

SYMPTOMATOLOGY AND DIAGNOSIS OF ACUTE MILIARY TUBERCULOSIS.

Cornet (see Abstract on Etiology) distinguishes between the symptoms of this affection according as they are caused by the toxins or the direct presence of the tubercles.

The toxic phenomena are the earliest to appear and the most intense. After the irruption of the bacterio-proteins and living or dead and disintegrated bacilli into the blood, there is a slight period of latency (from 4 to 24 hours). If the primitive focus is recent or small, much less toxic matter is absorbed than when the deposit is old and large. The bacilli tend to cohere in their passage through the circulation, and when a vascular twig of a certain calibre is reached an embolus is formed. We can therefore understand why in certain exceptional cases of acute miliary tuberculosis, but a single organ is affected.

As a rule the majority of bacilli which enter into the blood are alive and virulent; and when their course is arrested, proceed immediately to gave rise to secondary tubercles. The latter, forming to the number of perhaps 1,000, perhaps 100,000, give off jointly a considerable amount of tuberculin daily, with the production of the toxic class of symptoms.

The most common symptom of intoxication is the fever. The temperature changes follow no constant curve, and its very irregularity almost serves to identify it. In very acute cases in which an unusually large number of tubercles are deposited throughout the body, the curve of typhoid fever may be imitated, provided the encephalon does not participate in the deposit. When the brain is involved, with a high degree of tubercle formation, the effect upon the fever is depressing, so that the curve becomes extremely irregular. In cases with meningeal localization, the temperature may not go above 38° C.; while very rarely—independent of any meningeal tuberculosis—the course may be afebrile throughout (cases in the clinics of Föbringer and Eichhorst). This paradox is explicable only upon the supposition that the heart-centre of certain individuals does not respond to bacterial poisons (as in the case of typhus ambulatorius). In afebrile cases, however, we find other symptoms of severe intoxication, such as great prostration. *Per contra* we see at times consumptives with a persistent high temperature but no prostration at all.

The pulse in acute miliary tuberculosis is usually very rapid. It is small and at times dicrotic. The characters of the pulse are to be ascribed to the action of tuberculin in lowering the blood-pressure. A slow pulse (100) in this disease may or may not signify meningeal complications.

The respiratory symptoms are very important. Intense paroxysms of coughing are held to be due to the mechanical irritation of the vagus by the countless tubercles which have been deposited in the lungs. Accelerated respiration is a most constant symptom, and considerable dyspnoea is often conjoined. These phenomena do not admit of a satisfactory explanation. The sputum is scanty and often rusty, like that of pneumonia, from minute haemorrhages. When the nervous system participates, especially when the meninges are the seat of a tuberculous deposit, other symptoms are overshadowed by certain phenomena of cerebral origin: somnolence, vertigo, tinnitus, with temporary confusion of ideas. Later on, apathy and stupor set in with death in a comatose state. Exceptionally consciousness is retained to the last.

A prominent symptom is rapid loss of muscular power and a feeling of extreme prostration. Muscular movements are often accompanied by tremor; this extreme weakness is held to be due to the action of the bacterio-protein.

Returning to meningeal symptoms, we find beside those already detailed, vomiting, strabismus, pain and rigidity of neck-muscles, Kernig's sign, cerebral palsies, chronic convulsions, etc., etc.

The tongue has usually a blackish coat, due to minute haemorrhages.

Rapid emaciation keeps pace with the failure in muscular power. Scanty urine is naturally associated with the profuse sweating which often occurs. Cyanosis is present when dyspnoea is marked.

Coming now to the ensemble of the various symptoms, Cornet recognizes three well-marked clinical types of acute miliary tuberculosis.

1. The typhoid, so called from the great analogy which it presents with abdominal typhus. This type signifies that the action of the toxins overshadows the effects of any especial localization of tubercles.

2. The pulmonal type, in which the subjective and objective lung symptoms predominate. In this case the diseases which are initiated are croupous pneumonia and severe bronchitis. Death usually occurs from oedema of the lungs. This type of the disease is naturally accounted for by the excessive formation of tubercles within the lungs. The toxin production being less extensive than in the typhoid form, the tubercles have sufficient tissue before death can occur, to perfect their evolution within the lungs.

3. Meningeal form. Here, as in the pulmonic form the toxin production is not so large but that local development of tubercles has a chance to assert itself. While the lungs may not be spared, the meningeal localization dominates the pulmonary symptoms, so that the latter may be overlooked, in the presence of unbearable headache, and other cerebral symptoms already detailed. The meningeal type is especially common in childhood (in 87 cases Deurme found brain tubercles in all but 4).

In addition to these three principal forms, others, less well defined, have been described (pharyngo-laryngeal type of Catti, delirium tremens type of Waller, etc.)

As regards the course, while as a rule cases go to a progressively fatal termination, arrest and even improvement have been noted in the symptoms of certain patients. Cornet explains such cases by the assumption that at first only toxic material has entered the circulation; after the more or less marked tuberculin reaction, equilibrium is again restored (after elimination of the toxins). The original primary focus, however, is still active, and in time the bacilli enter the blood, along with

more toxins; and the fatal character of the disease is in due time asserted. Reinhold has recorded a case in which the patient was actually discharged cured, while the fatal relapse did not present itself for a month. In a case of Henoch, a series of relapses preceded the fatal termination.

The duration of acute miliary tuberculosis varies extremely. Death has occurred in a few hours. When cases are reckoned in which a long prodromal period occurs, due to insidious absorption of toxins from a primary focus, the duration may be reckoned in months.

With regard to the possibility of recovery, records of a few autopsies appear to show that such a termination is not impossible. From the clinical standpoint also, recovery seems to have taken place, and in one such instance the diagnosis appears to have been absolutely certain, since tubercle bacilli were found in the blood. In theory there is no valid reason why recovery should not occur. Tubercular meningitis, with diagnosis certified by lumbar puncture, has ended favorably. Tubercle in any locality may be encapsuled by the irritation caused by its own bacterio-protein. The fatality of acute miliary tuberculosis appears to be bound up in the possibility of endless relapse.

Under the head of diagnosis, Cornet first details the method of examining the blood, which is obtained by a capillary tube or at least from a finger-tip. The blood must be diluted and the centrifuge applied. Ordinary methods of culture, as well as animal experiment, require too much time, and the microscope must be, in theory, our chief resource in practice. We may, however, fail to demonstrate the presence of bacilli by this method. Some observers report finding but a solitary specimen while failures are very frequent; and as a matter of fact, practitioners do not place much dependence upon microscopy of the blood in the diagnosis of this disease. More satisfaction is experienced (in the meningeal type only) from the search for bacilli in the cerebro-spinal fluid (obtained by lumbar puncture).

Of great utility is the microscopic demonstration of tubercle in exposed localities, especially in the choroid membrane, and also in the pharynx and larynx.

Other diagnostic features are embraced in the symptomatology.

ON THE EARLY DIAGNOSIS OF PULMONARY TUBERCULOSIS.

Weicker, of Görbersdorf, writes an appreciative review of Knopf's paper on the early recognition of tuberculosis, (which was read last year before the New York County Medical Association) for the *Deutsche Aertzte-Zeitung*, Aug. 1, and 15, 1900. His comments and addenda are of interest. He agrees with Knopf that the solution of the problem as to whether or not tuberculosis exists in a given case, has not been brought about by Koch's discovery of the bacillus. Early diagnosis implies the recognition of closed foci in the lungs, which furnish no bacilli-bearing sputum. In a material of 1500 cases at Görbersdorf, in which tuberculosis had been diagnosticated by physical examination, at least one-third yielded no bacillary findings, for the simple reason that there was no sputum present.

Weicker also agrees with Knopf that the tuberculin reaction is not available in the diagnosis of human tuberculosis. The public view with suspicion the exhibition of a substance which can produce fever and sensations of discomfort; and some individuals even blame the development of the disease itself to the diagnostic injections made early in its course. Besides, many practitioners do not recognize the trustworthiness of this substance in establishing a diagnosis.

Knopf is supported by Weicker in his claim that red-haired individuals are not especially predisposed to tuberculosis. The Görbersdorf physician examined 4000 tuberculous subjects with this point in view, and found red-hair very seldom present. In this connection the observation by Delpuech is recalled. The latter found that not the head-hair but the beard and axillary growth are prone to be red in the tuberculous.

Weicker is in accord with Knopf in the belief that heredity does not necessarily mean a hopeless prognosis. Statistics, he states, would show that plenty of cases of "hereditary" phthisis may recover. Attention is called to the observations of Reibmayer, who believes that tuberculous ascendants in time confer a certain immunity upon their progeny. Knopf's endorsement of McLean's explanation of that phase of the phthisical cough which follows change of posture, as well as of Murat's subjective vocal sign, is evidently shared by Weicker.

Knopf's belief in the utility of examining the secretions of the upper air passages for bacilli, is not fully shared by Weicker, for the reason

that if they are found in the mucus of the healthy they need not stand in any relationship with the disease.

Weicker is sceptical as to the alleged benefits caused by haemoptysis on the ground that bacilli are thereby cast out of the body "by the wholesale." The only value of a haemorrhage from the lungs is the warning it gives.

Knopf advocates the extensive diagnostic use of the thermometer, but does not mention the search for slight elevations after meals and before the menses. Weicker advocates four measurements daily, otherwise the character of the tuberculous fever-wave cannot be properly depicted.

Weicker does not, like Knopf, recognize tachycardia as an initial symptom. He fully supports Turban's claim that the rapid action of the heart is due to a tuberculin intoxication.

Knopf is silent as to the precocious urinary symptoms which others assert are found in tuberculosis. These phenomena comprise Teissier's premonitory albuminuria and Michaelis's diazo-reaction. Koppert tested the urine of 100 tuberculous subjects in Weicker's sanitarium and got the diazo-reaction in but a single case.

Under the head of physical diagnosis, Weicker notes the omission of any mention of Krönig's method of apex-percussion.

Knopf's warning against the use of iodides to produce rales for auscultatory purposes is brought by Weicker in association with Kobert's view that these salts mobilize latent foci of strepto-cocci.

Both authors regret that thus far the Röntgen rays have added nothing in certainty to older methods of physical exploration; and both appear to be optimistic as to the probable services which the Gruber-Widal agglutination test may be expected to yield in time.

A NEW METHOD OF DIAGNOSTICATING PULMONARY TUBERCULOSIS.

Ferran (*Zeitschrift für Tuberculose und Heilstättenwesen*, July, 1900), refers to a paper which he published two years ago, in which the claim was made that a saprophytic modification of Koch's bacillus was to be found side by side with the ordinary pathogenic form in tuberculous sputum, and that further this saprophyte was able in certain conditions to produce a large amount of spermin, which substance could be recognized by the odor.

Since the year of this publication Ferran, who is director of the municipal bacteriological institute at Barcelona, has continued his experiments and has succeeded in finding a suitable culture medium for the saprophyte, viz: sheep-serum. Other bacteria do not flourish in this medium, so that a culture of the germ in question may be obtained in approximate purity.

The test is made as follows: to 10 c. c. sheep serum poured into a sterilized vessel of 15 c. c. capacity, add 3 or 4 c. mm. of suspected sputum. The two substances are slightly shaken together, and the vessel is covered and allowed to stand undisturbed for 36 hours at a temperature of about 37° C.

If now one uncovers the vessel and smells of the contents, the odor of human semen is distinctly perceptible.

This test has proved valuable in Ferran's hands when the ordinary search for Koch's bacillus has been attended with negative results.

VALUE OF THE TUBERCULIN TEST IN THE DIAGNOSIS OF TUBERCULOSIS IN INFANTS.

Mettétal has undertaken a study of this subject under the direction of Professor Comby at the Hôpital des Enfants Malades (*Arch. d. méd. des enfants*, Oct. 1900. The material consisted of 74 children from the crèche of the hospital. They were all at least one year old, and the ailments for which they were under treatment were rickets, gastroenteritis, diarrhoea infantum, bronchitis, athrepsia, etc., etc. In the majority of cases it was impossible to make a diagnosis of tuberculosis by any functional or physical signs. But autopsy in this class of children revealed lesions of tuberculosis in many cases, and especially those of miliary tuberculosis.

The first step was to determine the contraindications for the injections. These appeared to occur in the presence of atrophy, diarrhoea, cachexia, and in general whenever denutrition was in progress—under which circumstances the tuberculin test would at least be useless—; and also in all cases in which the fever was above 38° C. (100.4° F.), for in such patients the tests would not only be useless but dangerous. In other words tuberculin should be injected when the temperature is neither much elevated nor depressed (the latter usually being the

case in cachectics, athreptics, etc.). The limits fixed in this study were 36.5° C. (97.7° F.) and 38° C. (100.4° F.).

Another question to settle in advance had reference to the expediency or necessity of repeating the injection in case the reaction was not manifest. The author satisfied himself that as a matter of necessity, not more than two injections should be given during a single test, for fear of cumulative action.

In regard to the dose to be used for infants, the author found that one-tenth of a milligram should produce a reaction of at least 1° C. (1.8° F.), and not more than 2.5° C. (4.5° F.). The amount which might be given in safety is two or three-tenths of a milligram.

The tuberculin must be freshly made, and injected with antiseptic precautions, either in the nates, thigh or surface of abdomen.

The diagnosis of tuberculosis should be made when during the 24 hours following the injection, the temperature of the child increases by one or two degrees (1.8° to 3.6° F.).

In regard to collateral phenomena of the reaction, there is nothing constant to be noted. An erythematous rash, and the appearance of sibilant rales have been recorded in a few instances.

[The author discusses the subject of the nature of the tuberculin reaction in general, and the arguments for and against the use of the tuberculin test, but as this discussion has no special bearing on infants, it will be given in a separate abstract.—Ed.]

KOCH'S TUBERCULIN AS A DIAGNOSTIC RESOURCE.

Albert Fraenkel (*Zeitschrift für Tuberkulose und Heilstättenwesen*, September, 1900) states that no diagnosis of any localization of tuberculosis is complete without the demonstration of the bacillus. Therefore in suspected implication of certain viscera inaccessible from without, such as the serous sacs, bones and joints, in which there is no route of exit for bacilli, our diagnosis must necessarily be approximate. This also holds true for the earlier stages of tuberculosis in organs which do communicate with the outside world—as in the case of foci in the lungs before the bacilli gain access to the sputum. It is evident that the practitioner has an urgent need in such cases of some diagnostic resource which will as far as possible take the place of the actual dem-

onstration of the bacillus; and such a resource is found in Koch's tuberculin. This remedy having been put forward as a curative, the advantages which it presented as a diagnostic were somewhat discounted.

No one can truthfully dispute the claim that tuberculin has a marked affinity for tuberculous foci; and the one or two weak injections necessary for diagnosis cannot well be compared, in respect to pernicious direct and indirect effects, with the comparatively large and increasing doses originally advocated by Koch for curative purposes. Whoever has seen the contrast between the profound reaction of true lupus and the absence of any reaction in erythematous lupus—even when in the latter instance it is pushed a hundred fold,—will readily believe that this substance tuberculin must be of inherent value to the practitioner for diagnostic purposes. This value has been conclusively shown in veterinary practice, for despite all assertions as to untrustworthiness Fraenkel has been able to show by collecting the results of 8000 tests, that the amount of error is only between two and three per cent. When an animal reacts to tuberculin, but is found free from gross lesions of the disease on autopsy, the author feels certain that a careful microscopic study of the lymph-ganglia would bring specific foci to light.

A review of the proceedings of successive International Veterinary Congresses shows that the confidence in tuberculin as a diagnostic resource is increasing year by year.

As for the tuberculin-test in mankind, it appears from the statistics of Beck (1899), that the error is much greater than in cattle. Out of 2137 human beings with tuberculous lesions, but 54 per cent. reacted to tuberculin. In regard to particular localizations of the disease, however, apex-catarrh gave 85 per cent. positive, while in pleurisy the same percentage stood at 73 per cent.

There are two methods of controlling the findings in tuberculin tests; by results of operation *in vivo* and by post-mortem. These two methods do not have the same value. Thus if we inject tuberculin in a case of surgical tuberculosis, we may verify a positive test by macroscopic and microscopic examination of the extirpated focus. Should the test be positive and the suspected lesion prove to be non-tuberculous the investigator can fall back upon the hypothesis of a second latent focus somewhere within the body. Hence in surgical tuberculosis the test is more equivocal than in non-surgical tuberculosis with a post-mortem. The only infallible method of verifying provings of tuberculin is by the

most thorough autopsy, with especial attention to the state of the lymph-ganglia.

Fraenkel believes that the success in getting successful reactions is essentially a matter of technique, which latter must necessarily undergo much improvement.

CONTAGION AND PROPHYLAXIS OF INFANTILE TUBERCULOSIS.

D'Espine of Geneva read a paper with the above title at the recent International Congress at Paris (*Annales de méd et de chirurgie infantiles*, Sept. 1, 1900.)

He says that in children as in adults, latent tuberculosis is often demonstrable at the autopsies of individuals who have died from other diseases. Thus Bollinger in 500 autopsies of children of all ages up to the fifteenth year, found lesions of tuberculosis either inactive or latent in 218 cadavers. Of this last number 150 cases represented active and 68 latent tuberculosis.

Küss, in 1898, showed that the maximum of deaths from tuberculous lesions in childhood is reached between the second and fourth years.

All such mortality statistics and even many of the figures which are concerned with the morbidity of tuberculosis, exclude from consideration all cases of so called scrofula, which are also most numerous in the first quinquennium, according to Wohltemuth, Lannelongue and other authorities; although Lebert and Rable found the morbidity from scrofula very much smaller in the first, as compared with succeeding quinquennia.

With regard to the propagation of tuberculosis every communicable disease appears to have its peculiar mode of transmission. In tuberculosis the principle vehicles are the human sputum and the milk of animals.

The minimum proportion of tuberculous cattle is at least 6 or 7 per cent., and the maximum may run up to 20 per cent. and 25 per cent in large herds.

However, the problem of tracing the exact casual relations between infected milk-supply and infantile tuberculosis is a difficult one. As autopsies appear to show that in 90 per cent. to 95 per cent. the bronchial glands contain the oldest foci and therefore presumably represent the point of entry of the bacilli; and as, furthermore, examples of primary intestinal tuberculosis are comparatively infrequent, it would seem at

first sight as if the contingent of alimentary infection is a small one. But it is common enough to find in the first three years of life and in children with bronchial and pulmonary foci, a collateral complication of the mesenteric glands. In older individuals the latter localization could be accounted for by swallowed sputum, but this hypothesis could not be applied in the case of children too young to expectorate. It would appear then that this association of pulmonary and mesenteric lesions is due to double infection, by the respiratory and alimentary routes combined.

In any case it well appears that the human sputum is by far the most potent source of contamination of childhood.

Numerous cases are upon record in which the contagion of tuberculosis has been traced to direct contact of the victim with fresh sputum. A type of this method of propagation is found in the celebrated case of Reich (reported in 1879); in which a phthisical midwife infected ten new-born infants by the mouth to mouth insufflation of air in connection with attempts at re-animation. These children all succumbed to tuberculous meningitis. Cases equally convincing have been reported by the author (in connection with kissing), Demme (tasting the child's food before feeding it), Wassermann, Haltenhoff (infection by the conjunctival route), miscellaneous authors in connection with ritual circumcision, etc., etc.

The fact remains, however, that in the vast majority of cases, children, like adults, are infected through the inhalation of dried sputum, this origin being attested by the 90 per cent. to 95 per cent. primary implication of the bronchial glands.

There still remain for consideration ganglionic and osseous tuberculosis. The former *may* be due to a primary localization of the germs in the tonsillar structures, carious teeth, but in the vast majority of cases the lesions in both cervical ganglia and bones occur consecutively to infection of the bronchial glands.

As special features of transmission, Derecq has emphasized the coincidence of tuberculosis with a history and actual evidences of onychophagy,—it being assumed that the finger tips of the infected child have been soiled with an infectious dirt from the floor; while Dupont has reported wholesale infection of school-children, presumably from the expectoration (upon the floor of the school-room) of a phthisical pedagogue.

Under the head of prophylaxis, the author briefly considers the up-building of the child's physique, seaside sanatoria, altitude cures, rural asylums and vacation colonies.

ON THE FEEDING OF PHTHISICAL PATIENTS IN RELATION TO BODY WASTE.

Vincent Harris, one of the staff of the London Chest Hospital, has an original article on this subject in the *Edinburg Medical Journal* for August, 1900.

Wasting, he says, is the most characteristic, the most conspicuous symptom of tuberculosis of the lungs. It is often one of its most precocious manifestations. The exact relation, speaking chronologically and otherwise, between the existence of the virulent bacillus in the tissues and the first step towards emaciation, is very difficult to determine.

In experimental tuberculosis, there appears to be nothing like a "pre-tubercular stage." As a matter of fact after an animal has been inoculated he often takes on fat. This, besides, while tubercle is actually being deposited.

Wasting is not necessarily the result of fever, for it may antedate the appearance of the latter. Yet without fever, it is difficult to see how an organism which has started on the road to devitalization can make more waste products than a healthy individual.

If an afebrile organization continues to emaciate, such a fact could only be explained by diminished ingestion or assimilation, which in turn implies that the digestive organs are not themselves. Harris concludes that the tuberculous toxins are capable, in very small amounts, of both causing fever and interfering with anabolism.

Wasting undoubtedly occurs more rapidly when the muscles are much exercised. This is a matter, almost, of demonstration. Emaciation in the out-patient is almost continuous until admission to the hospital.

It follows that the man should waste more steadily than the woman, and this is borne out by documents.

The fatty tissues waste first, so that when these are consumed the rapidity of emaciation declines to some extent. The muscles are next attacked and by this time the febrile movement is sufficiently prominent to increase muscular metabolism. The weak, slow and labored

movements of the consumptive now become evidence of the state of the muscular system. The peculiar phenomenon known as *myoidema* may now be elicited—an abnormal irritability noticed in the pectoral, deltoid, scapular and other muscles. Myoidema, however, is by no means pathognomic of phthisis or even of ill-health in general; but it is of frequent occurrence during the period of muscular waste in consumptives. It may persist after the latter have been restored to apparent health, and hence cannot be due to mere absorption of interstitial muscle-fat.

Coming now to the question of feeding, rest is an indispensable adjunct to building up a phthisical patient with fever. The matter of diet itself is one of the greatest nicety. Taking the various classes of foods, proteids are known to augment proteid metabolism with increased elimination of urea; while at the same time they guarantee, as it were, a natural equilibrium in the metabolism of proteid tissues. On a substratum of proteid diet, fats and starches will fatten. If, however, the proteids are given to excess on a substratum of fats and starches, the body actually loses weight.

Harris insists that our object in feeding should be to build up muscle rather than simply to add fat to the body. To this end all three classes of food should be equally present; and if any kind is to preponderate, it should be the proteid. A daily ration for the consumptive should comprise, *in theory*, one-half pound of meat, one ounce fat, three gills of milk, one pound of bread, one ounce of butter, one pound of potatoes and three ounces of oatmeal. Of course in practice such a dietary would seem to be out of the question. With even slight fever there is a distaste for food which has to be overcome. But much can be accomplished by good cookery, and as far as the above mentioned diet is concerned, the various items are of course types of dishes which admit of unlimited variation. Thus by meat is implied beef, mutton, veal, chicken, fish, shell-fish, game, and in fact almost any kind of animal food. We may go still further and substitute eggs and nitrogenous vegetables for meat. Dettweiler has observed that many who dislike hot meats enjoy cold cuts.

When fat of meat is not relished there are many substitutes—fresh or clotted cream, beef drippings, marrow of bones, calves' brains, egg-yolk in wine, fish-roe, etc., etc.

Some of the starchy articles may be replaced by sugar preserves,

honey, marmalade, grapes in large quantities for the contained sugar, etc.

Harris counsels the so-called "paedagogic treatment" of "substituting obedience for appetite," or in plain words of forcing one's self to eat.

The other side of the alternative if the foregoing principles cannot be carried out, is to resort to Debove's *suralimentation* with concentrated foods, such as meat-powder. Here the appetite is entirely ignored, the food being transferred to the stomach by the oesophageal tube.

But aside from overcoming anorexia, we have weak digestion to contend with in a very large proportion of patients. If this condition be temporary or functional it may yield to a course of absolute rest, liquid diet and simple drugs (rhubarb, soda, nux vomica, etc.); with Carlsbad salts for constipation. If the indigestion be due to want of proper gastric secretions, the patient should be placed in the proteid diet.

As before stated, mere increase of fat, aside perhaps from the moral effect upon the patient is not necessarily an index of benefit. The patient is very apt to lose it when he leaves the sanitarium, so that it goes as readily as it comes. A very good test of improvement is to take on weight while doing considerable exercise, walking, etc. Under these circumstances it is fair to believe that the increase is in part muscular. When this point is reached Harris believes in allowing the patient to cycle, ride horseback, use dumb-bells, etc.

OF DEEP BREATHING IN PULMONARY TUBERCULOSIS.

Liebe (*Zeitschrift für Krankenpflege*, June, 1900) quotes with approval the dictum of the late Birch-Hirschfield to the effect that there are two essentials in the prophylaxis and treatment of phthisis, viz: asepsis if the inspired air and lung-gymnastics.

We must not, however, commit the fundamental error of regarding consumption as a local affection; for we are not to treat diseased lungs, but a diseased individual. It is a fact that the great majority of mankind breathe very superficially. Pure air and out of door air can accomplish little if only a small portion of the air cells are exercised. We cannot compare tuberculous lungs with a tuberculous knee-joint; for while the latter profits by functional rest, the reverse would be true of the former.

Dettweiler states that deep breathing not only ventilates the lungs

and aids the circulation, but in many cases is able to strengthen the muscles of the thorax, especially those about the superior aperture which become atrophied as the lung tissues undergo partial atelectasis. Langerhans, an authority on the subject of respiratory gymnastics, believes that we have a right to expect from this resource, a strengthening of the *locus minoris resistentiae*; and, if the lung has already become diseased, protection for the sound portions with resulting arrest in the progress of the disease.

With regard to the length of time which a tuberculous subject ought to stay in a sanitarium, the "thirteen weeks," which appears to be the usual period is of course determined by necessity and not choice. Turban's patients stay at his Davos Sanitarium on an average of 222 days; and in an ideal sojourn, at least three months ought to be devoted to a preliminary rest-cure. Rest, recumbency, feeding and gradual familiarisation with environment are what we must aim to secure during this period. This term should be followed by a second one, also of three months' duration, in which the patient should get up and about, begin light respiratory exercises, hydrotherapy, hill-climbing, excursions. After this period the patient should begin a preparation for returning to his occupation, so that there shall be no violent transition between sanitarium life and working routine.

Schultzen, who is also an advocate of skating as an exercise, and Carossa have both expressed the belief that deep breathing promotes the absorption of exudates in the lungs, and thus deprives the bacilli of an albuminous culture-medium.

Erni, who has charge of the Rigi colonies for consumptives, believes that a tuberculous lung is like a wound,—to be treated with rest. He therefore prohibits hill-climbing and pulmonary gymnastics. Nevertheless recognizing that something must be done to hasten the disappearance of infiltrations of caseous foci, etc., he advocates methodical percussion of the chest with a silver knife.

This method was first introduced by Erni in 1892. The rationale of the method is simple—the rythmical blows with the knife throw the thoracic walls and lung tissues into vibrations. While the lung substance may be made to vibrate because of its elastic fibres, the pent up secretions, infiltrations, etc., being unable to vibrate, are thrown off or absorbed.

While Erni's results from the application of this method appear to be good, and while Liebe is inclined to look with favor upon the "percussion-cure" he claims that it is anything but a rest-cure, since it is even more disturbing than the measures it is intended to replace.

Gymnastic-cures can only be carried out in sanatoria, and one of the most important duties of the future is to determine their scope, indications and technique.

THE SEARCH FOR A TREATMENT FOR TUBERCULOSIS.

Guinard (*L'oeuvre antituberculeuse*, April 30, 1900) after discussing the various dietetic-hygienic measures employed against tuberculosis, including the modern sanatorium movement, states that all these resources do not constitute *treatment* in the strict acceptance of the term. He thereupon passes in review the various therapeutic measures at present in vogue, saying that while we have not much to look forward to in this regard, we must not lose sight of certain facts. While apparent improvement may follow the employment of many individual drugs, the rationale of the degree of success being open to the suspicion of suggestion, it is still true that in laboratory phthisis in dogs the inhalation and injection of turpentine considerably retarded the normal evolution of the disease (twice as long as the course in control animals). The first experiments in this direction by Richet and Hericourt in 1898 have been repeated recently with other drugs in place of turpentine; and the surprising result was that apparently almost inert substances like salt or chloride of ammonium can similarly retard the development of the disease.

Experiments of this sort, if they prove anything at all, appear to show that in theory at least, a great variety of substances susceptible of absorption and resulting intimate contact with the cellular elements of the body, may be capable of checking the progress of phthisis to a greater or less extent.

But Guinard states that we are not searching for remedies to prolong life, but to cure. From this point of view the research in the direction of pharmaceuticals promises hardly anything, and the study of active principles must be almost reorganized.

Toxino-therapy represents an extensive departure from old methods of treatment, and does not at first sight inspire much faith. Guinard

does not believe that an immunizing substance could be obtained from the soluble products of the bacilli, since a first attack of tuberculosis does not tend to confer immunity but rather predisposes to others.

Serotherapy, according to Landouzy, has accomplished nothing which drugs could not as well. From what has been already stated, then, it results that it would be a waste of time to follow up this phase of treatment at present.

Richet and Hericourt have recently introduced the so called "zono-therapy" based upon results obtained by treating experimental tuberculosis with muscle-plasma. In the opinion of Guinard this line of research is quite promising. The use of raw meat in tuberculosis dates from very ancient times. Debore once made a good showing clinically with this substance.

According to Richet and Hericourt, zono-therapy appears to be only a form of super-alimentation. It is as yet too soon for obtaining clinical reports, as the two authors themselves have employed the muscle-plasma upon dogs only. Doubtless the remedy will be extensively tried in the near future.

Guinard now takes up the subject of the tuberculizable soil and of the prospect of making it refractory. This conception he proceeds to outline as follows:

Laboratories of physiology and bacteriological chemistry must carry out elaborate researches upon the tissues and secretions of the refractory and the tuberculizable. Aided by animal experiment, the secret of the difference between the two kinds of tissue may in time be learned.

At the same time physiological therapeutics and pharmacodynamics should endeavor to determine what agencies are able to successfully modify the tuberculizable organism.

Bacteriological laboratories can of course render indispensable services, especially in regard to association of infections.

Finally the laboratory of pathological anatomy will complete the chain of special research into the nature of tuberculosis.

This system of investigation is actually projected at the Institute Antituberleux at Hauteville, of which sanatorium the author is to be the director.

This institution will be supplied with all the laboratories just enumerated.

Professor Arloing will officiate as inspector of laboratory work, and science will be on a footing equal to that of practice.

THE MEDICAL TREATMENT OF PULMONARY AFFECTIONS.

Under the above title Goldmann (*Wien. med. Presse*, Sept. 2, 1900) writes at length upon the use of "sulfosot-syrup" in lung diseases and especially in phthisis.

Creosote, he says, has too many defects and drawbacks, such as its causticity, repulsive taste and pungent smell. Many attempts have been made to devise a substitute for the drug, and the manufacturers of the sulfosot-syrup have succeeded in producing this preparation only after prolonged and almost hopeless efforts. Thiocol and sirolin, made by the same firm of chemists, have already won for themselves a place in the *materia medica*.

It is known that creosote does good only when large amounts of it can be tolerated; but only a small number of patients can ingest pure creosote in the requisite amount.

Among the untoward symptoms caused by the irritant action of creosote on the mucosa, are disturbances of stomach and bowels, lessened appetite, diarrhoea, albuminuria and hematuria, the latter symptoms accompanied at times by symptoms of cystitis.

Practitioners have now become fully aware that a one-sided treatment of tuberculosis, whether hygienic-climatic, hydiatic, etc., does not lead to a satisfactory result. Further, tuberculosis is a disease of the poor, and sanatoria can never be equal to caring for any considerable portion of this class of people. It therefore behooves us not to neglect the medicamentous treatment of the disease, since it is of general applicability.

Thiocol and sirolin which have proved their value in phthisio-therapy, are somewhat too expensive for use among the poor; and the manufacture of the syrup now under discussion has for its aim the production of a remedy which is intrinsically low-priced.

Sulfosot is a dark-brown. syrupy substance which is wholly odorless, with a pleasant bitter-sweet taste, perfectly non-toxic, and devoid of causticity. A bottle of sulfosot syrup contains 15 grams sulfosot—equal to 10 gm, pure creosote. The usual daily dose is 3 teaspoonfuls (children 1 to 2 teaspoonfuls).

The action of sulfosot syrup upon inflammatory and catarrhal pro-

cesses in the lungs and upon the course of phthisis is a very favorable one. It mitigates the cough and lessens the expectoration and diminishes the bronchial secretion.

With regard to physical signs, the rales, rough bronchial breathing disappear gradually and even in some cases the area of percussion dullness has become smaller.

Goldmann describes the case of a bookbinder with all the evidences of phthisis including bacilli in sputum, who used sulfosot-syrup for 4 months, and recovered completely, other cases are briefly mentioned which appear to show that the remedy represents the full beneficial action of creasote with no drawbacks.

Sulfosot is said to be actually the creosoto-sulfonate of calcium; and besides its value in phthisio-therapy, Goldmann recommends it in a variety of other affections, such as acute and chronic bronchitis, asthma, scrofula, etc.

NUTRIENT ENEMATA OF CODLIVER OIL IN TUBERCULOSIS.

Zeuner (*Therapeutische Monatshefte*, June 1, 1900), who had a case of phthisis referred back to him from a sanitarium, resolved to place him upon nutrient clysters of codliver oil.

This patient was 38 years old and had had pulmonary disease for 10 years. He presented a picture of extreme emaciation and weakness. Physical signs of advanced phthisis were present, with profuse amount of sputum containing bacilli.

Complete bed-rest was ordered, with cod-liver oil per os—which was well borne—and later on enema of codliver oil was prepared; 250 c. c. to 50 c. c. water, in which was dissolved pancreatin 5 gm., inspissated ox-gall 0.5 gm., sodium chloride 1.5 gm. The whole was digested for two hours and 3 drops ethereal oil of eucalyptus were added. Of this amount 60 to 100 c. c. were injected each evening. There was no local reaction. These enemata were used steadily for 6 weeks without once causing diarrhoea.

After the patient had been under the treatment for 4 weeks, the injection was given in the knee-elbow position, and was also retained. The stools were examined to determine the amount of oil retained; 30 gms. had been injected and swallowed, and 24.6 gms. were

found in the stools. It is assumed that the amount taken per os was all absorbed, so that the amount retained per rectum would be 5.4 gms.

For the first three weeks there was no gain in weight, but in the next two weeks, $1\frac{1}{2}$ pounds were taken on. All the symptoms visibly improved. Patient became able to walk about, and his subjective condition was better than at any time for years. The ultimate result is not stated.

A search through literature revealed to the author that this idea of nutrient enemata of codliver oil in phthisis was not new, although it appears that but one practitioner, viz: Revilliod of Geneva, had ever employed this remedy methodically. It appears singular that the numerous physicians who have studied the subject of fatty enemata, have ignored the possibility of employing cod-liver oil for this purpose.

Revilliod used the following formula: codliver oil and warm water equal parts (600 c. c.), with the yolks of 2 eggs. If the mucosa was irritable he used one part (500 c. c.) of oil to two (1000 c. c.) of warm water, emulsified the oil with a little gum tragacanth (2.5 gm.) and gum arabic (0.5 gm.) and added 2.5 gm. hypophosphite of calcium.

Revilliod states that these enemata were well borne. They were administered in the evening. Opium was sometime applied locally before making the injections.

According to Fleiner, Kussmaul, when a young practitioner, made use of this resource, but soon renounced it because the oil was quite promptly expelled by the rectum.

The author apparently claims nothing more than the following: that enemata of pancreatinized oil are well borne even in the very ill; that 75 gms. emulsion can be tolerated every 10 or 12 hours; and that it is not necessary to give a prior injection to secure cleanliness.

ON THE USE OF PERSULPHATE OF SODA IN THE TREATMENT OF TUBERCULOSIS.

Garel of Lyons (*Le bulletin médical*, Aug. 22, 1900) states that when chemically pure, this salt can exert a remarkable influence over the appetite and digestive functions. As an oxidizing agent, it excels even the salts of arsenic and vanadium; and is much less toxic than the latter.

In 1899 Friedlander demonstrated the great antiseptic qualities of this sodium salt; while more recently its toxicity has been thoroughly

studied by Nicolas. It was found to be but feebly toxic. Incidentally it was discovered to have a constant antithermic action.

Nicolas found that nutrition was promoted by the persulphate in both man and animals. Rabbits and dogs gained in weight independently of the method of exhibition.

When given to human subjects, both tuberculous and otherwise, appetite, digestion and weight were all improved. Without claiming too much, Nicolas contented himself with saying that in doses of 0.15 to 0.3 gms. the persulphate is an excellent appetizer and eupeptic.

Garel was therefore very anxious to test this remedy in his tubercular patients. Admitting that air and aliment play the major part in causing recovery from tuberculosis, a city hospital is hardly the place to expect the best results from either. It will be a long time before the sanatoria can care for all these phthisical cases and in the meantime we must find some means to arouse the appetite. Once this is done, the patient can make use of the hospital diet, which is suitable when he has become used to his surroundings.

We cannot expect in the crowded wards of a city hospital the same stimulation which comes from a sanatorium in the mountains, and we have to depend on drugs. Within the past few years we have seen the exhibition of arsenical preparations revolutionized by the introduction of the cacodylates. Lyonnet has similarly made use of vanadium salts. The persulphate of sodium, either chemically pure or in the formula called "persodine," belongs to this category of new antituberculous remedies.

The sodium salt should always be taken on an empty stomach, one and one-half hours before eating. One dose suffices for 24 hours. By the second or third day, the patient is sensible of an imperious desire to eat. After he has taken food he is impressed with the facility with which his stomach does its work. It appears to be the wisest course to suspend the treatment for a time after the third or fourth week.

Given in advanced cases of phthisis the results will be nil; we must not expect the remedy to be a panacea or specific. It has a special indication, viz: to rouse the appetite in the earlier stages of the disease. Aside from tuberculosis, the persulphate should of course be found of value as a stomachic and promoter of nutrition in anorexia and weak digestion from any cause.

EDITORIAL.

ORGANIZED STUDY OF TUBERCULOSIS.

After the reaction from the hysterical excitement of the first tuberculin era, when both profession and public expected miracles, after equilibrium had been again established and when the world had recovered from the shock of bitter disappointment, there followed a period of sober consideration of the possibilities surrounding this very prevalent disease. Conservative investigators saw in Koch's experimental data future possibilities. Koch's careful investigations opened up a new path of research, not only in tuberculosis but in other diseases of microbic origin.

Evidences of the ever-growing interest in tuberculosis are daily becoming apparent. Local boards of health are making efforts to control and regulate the disease. Massachusetts has had a state sanitarium in operation for two years; New York State has made an appropriation for a state tuberculosis hospital; other states are considering falling in line. Societies have been organized for the sole purpose of preventing the spread of the disease by educating the public to its dangers; local aid societies are making the teaching of the consumptive poor how to protect their families and neighbors secondary only to their regular mission.

Evidences of a more careful individual study of tuberculosis on the part of the profession are on every hand. Articles on tuberculosis showing careful study and thoughtful analysis, and without sensationalism have appeared with increasing frequency in general medical journals. Journals devoted to tuberculosis have been accorded hearty support. Greater care is shown in physical examination of the chest—we have fewer shirt-front stethoscopes, fewer corset-pleximeters, and as a consequence fewer "weak lungs" diagnoses and more early diagnoses of tuberculosis.

The natural outgrowth of all this individual interest and study is organization, the advantages of which are as great as those of an organized army over a motley mob;—systematization of study, stimulation

to greater efforts and more careful investigation, co-operation and all the benefits to be derived from honest mutual criticism.

In this connection, we note in the *Johns-Hopkins' Bulletin*, December, 1900, the announcement of the organization of "The Laennec"—a society for the study of tuberculosis, "organized to systematize and stimulate the work on tuberculosis in the hospital, to educate its members and to diffuse in the profession and the public a knowledge of the disease." In connection with this organization, it is proposed to establish a library on tuberculosis.

With Dr. Osler as chairman and with the facilities for material, study and investigation in Johns-Hopkins' University we see in the society a most valuable addition to the world's working force against tuberculosis. The establishment of such a society in each of our greater universities would hasten very materially the solution of the tuberculosis-problem; a congress of these societies would further increase their value and in the end lead to the rescue of hundreds of thousands of the victims of tuberculosis.

THE NECESSITY OF SYSTEMATIC EXAMINATION OF BLOOD OF CONSUMPTIVES.

In spite of much literature to the contrary, there seems to be prevalent among medical men an idea that the pallor of the average consumptive is an evidence of anaemia. That such is not true, in the ordinary acceptation of the word "anaemia," can be easily demonstrated by any one who will take the trouble to make blood examinations of a few of his tuberculous patients. Except in very advanced cases, where secondary anaemia is present, in the majority of cases the red-count will closely approximate normal, many times exceeding it; the white-count will vary from the normal in incipient and uncomplicated cases to a leucocytosis of milder or stronger degree in cases with pneumonic foci or where softening is going on or where excavation has already taken place; and the haemoglobin will be found to range from 65-95 per cent.

This frequent lack of relation between the anaemic appearance of the patient and the actual blood condition readily explains the frequent apparent uselessness of reconstructives in phthisis. It is not that the tonic is at fault, but the physician who has prescribed for a condition not present, on the misinterpretation of a symptom, the disappearance of which is awaited as the result of a misdirected treatment.

It must be remembered that the pallor stands in no wise in relation to the blood-poverty, and that in order to prescribe intelligently for the blood-condition in tuberculosis a systematic examination of the blood is absolutely necessary.

The microscopic examination (with high powers) of both fresh and stained preparations should always be made, stress being laid upon the appearance of the red-cells,—color, size, shape and uniformity. Differential counts of the white-cells have up to the present given little or no information to guide us in our therapeutic measures.

The absence of leucocytosis may usually be interpreted as indicating the absence of softening of any large extent, and of cavities, but the contrary does not hold true, for there are so many factors in the production of leucocytosis that the most careful exclusion will not suffice to make a positive diagnosis of excavations or softening, the physical examination of the chest usually giving much more satisfactory and accurate information of their presence.

In the diagnosis of incipient tuberculosis before the presence of tubercle bacilli in the expectoration, we can at present look for no aid from blood examinations.

It is true that over-enthusiastic individuals have claimed to be able to not only make a diagnosis but to foretell the advent of the disease—pre-tubercular stage. In the recognition of such a stage the tubercle bacillus must be ignored as the etiological factor of tuberculosis, and few men have the hardihood to do that at present.

SUPPLEMENT TO THE JOURNAL OF TUBERCULOSIS.

In this part the whole subject of Pulmonary Tuberculosis will be covered by a continued series of articles written by Dr. Karl von Ruck to appear in the following order:

Article I.—The Cause of Tuberculosis, and The Conditions Which Predispose to its Acquirement. Article II.—The Prevention of Tuberculosis. Article III.—The Pathology and Symptomatology of Pulmonary Tuberculosis. Article IV.—The Diagnosis of Pulmonary Tuberculosis. Article V.—The Prognosis of Pulmonary Tuberculosis. Article VI.—The Treatment of Tuberculosis, Dietetic, Hygienic and Symptomatic. Article VII.—The Climatic Treatment. Article VIII.—The Specific Treatment. Article IX.—Laryngeal Tuberculosis, its Diagnosis and Treatment. Article X.—Institutions for the Treatment of Pulmonary Tuberculosis.

THE TREATMENT OF PULMONARY TUBERCULOSIS.

There is probably no chronic structural disease of vital organs that shows greater tendency to repair and recovery, than does chronic tuberculosis of the lungs. The aid that we can give therapeutically is also very great; but for the appreciation of these advantages and for the proper application of the available means, an intimate acquaintance with its pathology and with the influences that favor or retard the local reparative processes is necessary.

The chronic course of the disease, extending often over many months or even years, is liable to cause lack of interest and a tendency to routine methods on the part of the physician in charge, which are favored by the patient himself, who, with amelioration of his symptoms, is likely to relinquish his own efforts as well. Both physician and patient contribute in such and other ways to the occurrence of relapses, and eventually to an adverse result, which could have been avoided, had each done his part well, and at all times.

If the solicitude and interest of physicians in their tubercular patients would be as great and continued, as they are in acute diseases, in which the termination in death or recovery is usually near at hand; if physicians were to consider from visit to visit the needs of their phthisical patients as carefully as they do in cases of acute lobar pneumonia, typhoid fever or scarlet fever; if they would seek to obtain exact knowledge of the pathological changes in tuberculous lungs, as do surgeons of the lesions for which they contemplate a capital operation; and if they

would watch the course of the disease as the successful surgeon watches over the results of his surgical interference, and over the convalescence of his patients, many of those who have now but little faith in our resources for the successful treatment of phthisis, would be astonished to observe how amenable this disease really is to continued and well directed efforts, when they are made before a hopelessly advanced stage has been reached.

That the thorough and constant co-operation of the patient is *sine qua non* to successful treatment is self-evident, and I mention it only to again emphasize the fact, that in order to secure it, the patient himself must be made acquainted with and realize the nature of his disease, and the responsible part which he, or in case of children, the interested guardians, must assume in order that our combined efforts shall result in recovery.

Such relation between physician and patient must obtain from the very beginning, and even with the earliest manifestations of the disease our demands must be as rigorous and uncompromising as they would be, if symptoms pointing to immediate danger were to confront us, because only through such a course can we avoid their actual occurrence. If we ever accept anything less than an ideal course from our tubercular patients, in complying with our requirements and advice, let this be in instances where the patient's prospect for recovery has been nearly or practically lost.

The attitude of patients, still in good physical condition and who have but slight symptoms, is often such that they feel themselves secure and expect to recover with but little effort or sacrifices on their part; they wish to continue their mode of life, business, domestic relations and responsibilities, because they have as yet but little or no sense of illness, and feel strong and well enough to go on. To such it would be wise to point out, that every advanced and hopelessly ill patient has, at one time, been in an equally early and hopeful stage, that the prospects for recovery will never be better, that they must act promptly and efficiently at a time when their sacrifices will be rewarded by recovery, instead of waiting until there is but little chance for success. This applies also to financial sacrifices, which some patients, although able, are most reluctant to make. I could relate many instances where the plea of inability to meet the expenses necessary to afford the patient the best chance, led to the adoption of compromises

under which no real progress was made, and then, later, when the greatest prospect for recovery was lost, or the patient was hopelessly advanced, money was expended most lavishly to prevent the adverse termination. In all earlier stage cases it is safe to say, that the amount of money necessary to be expended for the obtaining of a recovery under the best advantages, is usually less than will eventually be expended, by the adoption of half-way measures, which greatly jeopardize the final result, and that it takes more money in the end to meet the expenses in an adverse course of the disease until the patient finally dies and is buried.

A firm position on the part of the physician in such and other questions that influence the future course of the disease, becomes a means of saving lives that would otherwise be lost, and it is an important requisite to successful treatment to start out right at the beginning in acquainting our patients with what we must expect of them for their own welfare and interest. Our demands should, however, never exceed a limit with which the patient can reasonably comply, and in formulating them, we must take into consideration all the attending circumstances in an individual case.

Having made the diagnosis and learned the present condition and attending circumstances of the patient, and having determined upon the course which we believe to be within the patient's ability to follow and will give him the greatest prospect for recovery we should make our prognosis as favorable as possible, at the same time cautioning the patient, that such a favorable outcome can only be expected if he will do his part faithfully and at all times. If the course determined upon implies that the patient should have the advantage of climate, or of treatment in a special institution, no unreasonable delay must be permitted in effecting the change, but until the patient can make it, and in cases where this is not feasible or expedient, the first step is, to order the patient's mode of life from a hygienic and dietetic standpoint, and to meet such present symptoms which require attention.

THE HYGIENIC AND DIETETIC TREATMENT.

Much that has been said upon the subject of prevention for predisposed subjects, applies here also; the object in either instance being, to secure a normal physiological mode of life, which favors the patient's nutrition and general vigor to the greatest degree possible.

In the established disease, the means to this end need, however, be more closely regulated and adjusted to the patient's requirements.

THE PATIENT'S DWELLING AND SLEEPING ROOM. However simple the patient's home may be, it should not be located upon damp, clay soil; if it has a cellar this must be dry, and well ventilated; and if there is plumbing, we must know that it is in good sanitary condition. We should preferably recommend a dwelling in the open country, or at least one so situated that the sun can reach it from every side, with a southern, southwestern or eastern exposure according to the prevailing winds, against which there should be protection. It should have one or two piazzas, properly sheltered, but accessible to the sun a part of the day; and that such a dwelling should have facilities for proper heating and ventilation is hardly necessary to mention.

It should also have shade, but not too close to the building; a cluster or more of trees to protect against excessive heat, and to serve as a wind-break would be desirable.

The rooms should be amply large to give an adequate amount of air space for its occupants, and the selection of the patient's sleeping room should have our particular attention. It should be the best in the house as regards size, number of windows and access of sunshine, and if it has an open fire-place, to serve as a ventilator, this is all the better.

The more unfavorable the local climatic conditions are, the greater care should be bestowed that the dwelling and sleeping rooms shall come up to the above requirements as to size, ventilation and exposure to sunlight. Such a dwelling should not be situated on a steep hill, consideration being taken of the grade that the patient may have to ascend in taking exercise. Furthermore, the dwelling should not be near dusty streets or be exposed to soot and smoke from factories, etc. It should be kept scrupulously clean, should be well ventilated by lowering windows, both day and night except in very cold and stormy weather.

Carpets, especially in the room or rooms occupied by the patient, are objectionable; instead, movable rugs may be used,—these should be dusted and cleaned out of doors; there should be no sweeping with a broom; the floors should be wiped up with a wet or damp cloth, and the dusting of the room should be done in the same way. If carpets cannot be gotten rid of, they may be swept when the patient is out of the room, after first scattering plentifully small bits of wet newspaper or tea

leaves over it, to take up the dust. The patient should not re-occupy a room that has been swept with a broom, under one or two hours, until the dust has settled and has been removed from the furniture. In so sweeping a room the windows should be open, but it should not be done at all when the wind is in a direction to prevent the exit of the dust through them. The temperature of the rooms should be properly regulated by plentiful ventilation in the summer, and comfortable heating in cold weather. It is, of course, best that in winter the whole house should be heated uniformly, and especially should there be no cold halls and toilet rooms, in which the patient is liable to become chilled upon entering from heated living and bed rooms.

People who have never had the advantages of a comfortably heated house in all of its parts are, as a rule, accustomed and inured to their environment, but when their general nutrition and vigor have been much reduced by disease, they need more adequate protection. On the other hand, the mistake of overheating the rooms of phthisical patients is not infrequently made on the part of the rich and poor alike, and a temperature above 70 degrees F., during the hours when the patient is up and about the house, should not be permitted. Little or no heat should be maintained in sleeping rooms when the patient is in bed, excepting in very cold weather or for far advanced cases, when adequate clothing and covering would become a burden on account of their weight. In such cases we must bear in mind the patient's sense of comfort and supply what heat is required.

Precautions as to proper heating of the room at night for patients who suffer from night-sweats, so severe that they require change of night-clothing, must, however, not be neglected, and careful nursing of such a patient should anticipate the time when a fire should be lighted, or heat turned on the room, to insure the patient against chilling and discomfort while changing his night clothing.

Patients who expectorate must be provided with a cuspidor containing water, or with sanitary cuspidors having covers for use in their rooms and upon the piazzas which they occupy, and they should be properly instructed in all preventive measures as I have described in detail in the article on prevention. (1.)

THE PERSONAL HYGIENE OF THE PATIENT should be carefully supervised. In regard to clothing, excessive amounts should be avoided, both in sum-

(1) Journal of Tuberculosis, Vol. I, p. 76.

mer and winter, so that the skin is never in a state of sensible perspiration when the patient is at rest or taking moderate exercise. Extra coats and wraps should be used for out of door life when the weather is cold enough to require them. The object to be attained being that the body is comfortably warm in winter, and not over-heated in summer, avoiding sensible perspiration as far as possible.

Most errors by patients are committed with regard to their undergarments and footwear; there are those who, just because they have a lung affection, dress their chests with thick woollens and supplement them with extra flannel or with felt and chamois-skin chest protectors, hoping thereby to avoid taking cold—a practice which is most reprehensible and should always be discountenanced by the attending physician. If it were only for the discomfort from such excessive coverings of the chest, they should be discarded, but under their use the skin is constantly in a state of perspiration and actually soaked with sweat, its nutrition becomes impaired, it loses its power to react to thermic stimuli, and the object of the precaution is defeated, the patient being much more liable to contract colds from slight exposures than he would otherwise have been.

In the choice of undergarments, I formerly shared the popular belief, that wool next to the skin was really an essential, and that the consumptive should wear it at all times of the year, adopting light weights for summer and heavier fabrics for cold weather. It was with some degree of misgiving, when I consented to make a trial of linen underwear, which at first I did only with those who claimed positive discomfort from even the lighter weights of woollen garments during the summer months. Within the last few years, however, I have had reason to satisfy myself, that linen is not only permissible for all patients during hot weather, but that such patients who are still well nourished can wear it in the winter months as well, and that the linen is not only conducive to increased comfort, but is actually desirable from a hygienic and therapeutic standpoint. While I have not found it a panacea against the contraction of colds for all patients who were wearing it, some claimed that they suffered less frequently and others that they had escaped entirely; all, however, testified to their increased comfort from the change. From my personal experience, I can state that sensible perspiration is quickly absorbed by the linen, that the skin can be kept in a better condition than with either cotton or wool, and that

my efforts to improve the nutrition and function of the skin in my phthisical patients have been materially aided by the use of the Deimel linen mesh under-wear, and in some instances such efforts proved fully effective only after its adoption.

The application of common sense is essential in the matter of outer garments as well as in other things; bearing in mind that what we seek is comfortable protection of the habitually clothed skin surface at all times, we must make such changes in fabrics and in their thickness as the temperature, changes in place, time of day and season require for the individual case. Anaemic and thin patients require, as a rule, thicker outer garments than do others, and there are those who under certain individual peculiarities require more, and others who require less surface protection for comfort, for which we must accept the statement of sincere and sensible patients.

More scrutiny is necessary with young, or so-called fashionable ladies, who often for appearance sake decline to be governed by good advice. Having pulmonary tuberculosis in any stage, we must insist with such, that they are sick for the time being, and must conform to the requirements of personal hygiene, and with all measures that we deem essential to the recovery of their health. The fight against the corset will rarely be won by the physician, but a compromise to the wearing of one that is least objectionable, and to the abandonment of tight lacing can usually be accomplished. The low neck and short sleeved dress can also be eliminated with most of them, but objection to sensible foot-wear will not be infrequent. As to the latter, we must insist that slippers and thin soled, high-heeled shoes, cannot be worn outside of the bed room and in badly heated houses. For wear out of doors and upon piazzas, and during cold weather in houses that are not heated throughout, we must require a "common sense" shoe with thick soles, the uppers coming well up the ankles, and no change from such protection to the feet should be allowed for special occasions. There is no surer way to take cold than to leave off the accustomed foot protection, in exchange for slippers or lighter foot-wear with thin soles.

Men are, as a rule, easier to manage in the matter of clothing and shoes, but need also to be cautioned especially about wearing slippers outside of their bed-rooms; if I could have my way I should banish slippers for men as well as for women. In wet weather and when snow is

upon the ground, overshoes are necessary, unless the patient's shoes have double soles, one being of cork.

THE CARE OF THE SKIN. Under the general mal-nutrition, in any stage, but especially of the advancing disease, the skin becomes anaemic, pale, or assumes a dirty gray color, in other instances it is dry and the epidermis scales off more rapidly than in health. The transparent, anaemic skin perspires very easily from the slightest physical effort. For such patients it is necessary to supplement the general treatment with hydropathic applications to the skin, consisting of the cold rub, the shower, or cold full-bath, to be followed by friction sufficient to cause a prompt reaction, evidenced by a sense of warmth and a gentle glow of the cutaneous surface.

The skin of patients who habitually and regularly apply cold water, is, as a rule, in a satisfactory state of nutrition and function, suggesting the wisdom of resorting to the cold water applications as a prophylactic measure for the maintenance of good general health, and for the prevention of the degeneration of the skin in the earliest periods of pulmonary tuberculosis.

Patients who have not been accustomed to the application of cold water by cold rubs and baths, should begin with the water at a temperature of about 90° F. and thereafter lower the temperature more or less rapidly, according to the present general strength and nutrition and the reaction that follows.

Strong and well nourished patients, in the early stage of the disease can, as a rule, begin with full immersion in a bath tub, which, however, should be only for a few seconds, and be followed by general friction with a coarse bath towel immediately on coming out of the water.

If the implied exercise fatigues the patient, or causes shortness of breath, the rubbing must be done by an attendant, and to be satisfactory, the reaction of the skin, shown by increased vascularity and pink color, must occur promptly, the whole procedure requiring usually less than five minutes.

If the reaction is slow, prolonged friction is necessary; the temperature of the water, at the next bath must be a little higher, but under all circumstances the friction must be continued until the patient feels comfortably warm and his body is perfectly dry.

As a rule, we can reduce the temperature of the water one or two degrees with every second or third bath until we reach 65° F. when

further reductions must be less frequent. I rarely allow temperature below 60° F. for immersion in the full bath; or below 50° F. for the cold rub or shower bath. It is of course understood that tub or shower baths must be given in a comfortably warm room in the winter, the best room temperature is between 60 and 70° F. With a higher room temperature, the patient is apt to break out into perspiration after the friction is completed.

In the absence of a bath tub, and to delicate, badly nourished patients, the cold rub should be given instead of the full bath, beginning with the temperature of the water also at about 90° F. and reducing it at subsequent applications the same as with the full bath. The large basin or bucket of water, of the desired temperature, is placed conveniently near the bed, and having removed the body linen, the patient is covered with a woolen blanket. The water is applied with a bath-glove made of several thicknesses of bath toweling, with the hand in it, it is dipped into the cold water, and squeezed out, so that it will not drip. The patient projects first one arm, and then the other from under the cover, the cold wet glove is quickly rubbed up and down, and the part is rubbed dry immediately. Next, the cold water is applied to the chest and abdomen, and in like manner to the thighs and legs, and finally to the back, each part being rubbed warm and dry, while other parts remain under cover of the blanket.

It is necessary that the bath glove be frequently immersed in the cold water, otherwise the temperature of the hand and of the patient's body increases that of the bath glove, when instead of a cold, we give a tepid application.

This rub must always be given by an attendant, and the procedure must be quick; it should not require over five or six minutes, and the fact that it takes more friction than can be given in this time, is an indication for increase of temperature of the water.

The cold shower or douche is only permissible in strong, vigorous patients, who have no active disease, and then only under competent medical supervision; its use is therefore more or less restricted to special hospitals and institutions. It is, however, a most valuable stimulant to the nervous system and to the general nutrition in properly selected cases.

Contra-indications to the full cold or shower bath, are marked anaemia, a weak heart, sub-normal body temperature, and the general

weakness and exhaustion in the advanced stages; also a marked tendency to pulmonary haemorrhage, the presence of acute pleurisy, or of other acute inflammatory processes in the lungs, diarrhoea, and the menstrual period.

For the cold rub, there are few contra-indications, these being sub-normal body temperature, actual or recent haemorrhage, and the last stages of the disease. Menstruation is usually not a contra-indication and many of my patients have had their cold rub without intermission on that account. In nervous and timid women, who fear that they will take cold, I have, however, at times consented to dispense with it, until the flow had stopped.

Many phthisical patients are afraid of cold water, and dread its use; by beginning with tepid water in the form of the rub, and very gradually decreasing the temperature, they soon learn to like it, and testify to feeling better for its use. Only after comparatively low temperatures of the water have been reached by the cold rub, and when no contra-indications exist, do I resort to full immersion in the tub, beginning these again with water that is at least twenty degrees warmer than the patient is accustomed to use with the cold rub.

Patients who receive cold rubs or full immersion daily, require no warm full baths for general cleansing, and for such, a warm foot bath is all that is necessary. The daily cold rub or bath followed by friction keeps the skin in the best condition and incidentally answers every purpose of cleanliness; it is the best protection against taking cold, it modifies the severity of night sweats or prevents their occurrence, it is a stimulus to the nervous system and to the cutaneous and general circulation. It should form one of the routines in the daily life of all persons, but especially of those who are subject to catarrhal affections of the air passages, and of those who are predisposed to or are actually suffering from phthisis, in a stage where we can still hope for lasting improvement.

These hydropathic applications are best given in the morning before the patient dresses for the day. If he is not robust, a glass of hot milk or a cup of coffee may precede it, and when finished, the patient should dress and, the weather permitting, he should take a short walk out of doors before eating breakfast. For patients having a sub-normal temperature at this time, the cold applications should be deferred to a later

hour of the day, but so timed that they are given at least two hours after eating a full meal.

I shall again refer to hydropathic applications in connection with the treatment of fever.

CARE OF MOUTH AND TEETH. Equally important is the care of the mouth, and of the teeth, of consumptives, especially when expectoration is one of the symptoms.

Upon arising in the morning and before eating, the mouth should be well washed and the teeth carefully brushed; every particle of food left in the mouth and between the teeth should be removed after each meal, and whenever food is taken between meals. The teeth and mouth should again be cleansed before retiring. Pure water with the use of a suitable tooth-powder mornings and nights, is quite sufficient for these purposes, but an antiseptic mouth wash may be prescribed, if the expectoration is offensive, or if such a prescription insures more systematic compliance.

REST AND EXERCISE. The recognition of the benefits from rest in the treatment of phthisis has steadily become greater and all those who make proper and continued use of this simple measure testify to the benefits derived.

Instead of the general advice, that was customary—and I may say was the rule,—ten years ago, directing phthisical patients to live out-of-doors, and “take all the exercise possible,” the demand for exercise is now no longer made without restriction and limit. So greatly has this position by the profession been reversed, that errors become apparent in the other direction, and absolute rest is sometimes ordered when the condition of the patient does not require it, and when a fair amount of exercise or even light labor would be to the patient’s best interests. No one will gainsay that for the best maintenance of organic functions and of the general health, a proper amount of exercise is necessary and that in health the ordinary hours of rest are sufficient for a physiological mode of life. This is, however, true only in a state of health, and finding that in the disease under consideration, exercise proves often a source of temporary or even permanent injury, it becomes necessary to understand the cause thereof, and so regulate and limit the exercise, or entirely interdict it, that the greatest good will result to the patient.

If we bear in mind that in health exercise is conducive to the best nutrition, that the blood and lymph stream are increased, causing better

nutrition of the cells and better elimination of waste products, it is apparent that its restriction below a certain degree, or its entire interdiction must be based upon weighty and sufficient reasons. There is, however, also a great deal of difference in the kind and degree of exercise that people may take, and it is needless to point out that great excess, beyond the individuals strength and endurance, can prove harmful even in health.

The proper relation of rest and exercise being a most important one in the general management of pulmonary disease, no physician can be said to have done his full duty to his patient, if he has failed to give it his careful and constant attention. The importance is easily understood upon considering that in structural diseases of the lung like tuberculosis, pneumonia, etc., the pulmonary circulation becomes embarrassed by obstruction of vascular channels between the right and left ventricle, through relaxation of lung tissue, compression, distortion and obliteration of the smaller vessels, and capillaries, from the presence of tubercles, inflammatory exudates, and infiltrations, obliterating arteritis, fibroid changes, pleural adhesions, and actual destructive processes.

When occurring rapidly or abruptly such obstruction may become an immediate cause of death, and I need only point out the fact, that it is the vascular obstruction from consolidation and inflammation of lung tissue which constitutes one of the chief dangers in croupous pneumonia by giving rise to heart failure—the right ventricle becoming inadequate to its task.

The degree of vascular obstruction which obtains in chronic tubercular and phthisical processes, especially when considerable lung areas have become involved, is often as great and even greater than in acute lobar pneumonia, where it immediately threatens and often destroys the patient's life. While the immediate danger is not as great in phthisis, because of the chronicity and very gradual development, and by the coinciding diminution of the total blood quantity, it is nevertheless just as real in the end, when the right ventricle has undergone degenerative changes in its muscular structure, and finally failed in its function. What is liable to occur in acute pneumonia quickly and in the course of a few days, is equally liable to happen in the chronic pneumonia we call phthisis, only it occurs in a slower manner.

The frequency and force of a normal heart is determined by the

demand of the tissues for arterial blood, it is therefore least during sleep and absolute rest, and greatest during severe physical exertion. With obstruction in the pulmonary system the labor of the heart becomes much greater, and as in certain diseases of the heart itself, the increased force can be supplied only by increased power of the muscular ventricle the prevention of its degeneration and the establishment of compensating hypertrophy become thus an object of great importance.

When the general nutrition of such a patient is not seriously impaired, and when no undue strain is placed upon the heart, the vascular deficiencies in heart disease are soon compensated by hypertrophy of the ventricle and although such a patient may still have to avoid unusually severe physical exertion, in time, the heart can maintain the necessary circulation required by a reasonable amount of physical labor. In some respects, the conditions and causes are different in tuberculosis of the lungs, in others they are analogous; in either case, however, the maintenance of a competent heart action and thereby of good pulmonary circulation is absolutely necessary for the welfare of the patient.

By the proper regulation of rest and exercise this object can be obtained much better than by the administration of stimulants and drugs; which latter may become adjuvants to the general management. These will be further considered with symptomatic treatment; here it is my purpose to point out how rest and exercise influence the circulation in the course of phthisis and how thereby it can become an injury or a benefit.

In the section on Symptomatology (1) I have made some references to this subject, and have there pointed out that the occurrence of a rapid, weak pulse is most frequently caused by heart strain; which, as a rule, stands in relation to physical and mental over-exertion, but that in such cases, the pulse returns to its normal force and frequency, when the patient is at rest.

Further, I pointed out that, the rapid and weak heart action is often preceded by a sharp accentuation of the second pulmonary sound, indicating excessive tension in the pulmonary artery, while the radial pulse is not as firm and full as we would expect from the forcible action of the heart.

I have observed these relations even in the earliest manifestations of tubercle formation in the lungs and although at such a period, we have

(1) Journal of Tuberculosis. Vol. II, p. 170.

not as yet extensive compression and consolidation, the shallow and weak respiration and relaxation of the affected lung tissue, favor retardation of the flow of blood, and lead to more or less congestion in the involved lung areas. In patients who at this time suffer already from failure of their general nutrition, and whose heart shares in the debility, we may observe palpitation or at least a small rapid pulse during hours when they take more or less exercise, but the circulation usually improves during the following night's rest and if we examine the pulse before rising, or in the earlier part of the day, we find it of good, or at least fair quality, and not unduly frequent. With such a patient it is then only a question of time when the heart will become permanently damaged; and all chances for recovery are liable to be lost if no measures are taken against it.

If the nutrition is still good and the heart has not been debilitated by long continued fever and progressive emaciation, or by undue physical strains, we find even in the presence of advanced or extensive lung involvement that the circulation is not materially disturbed although the patient takes moderate exercise. With increased obstruction, and increased tension in the pulmonary artery, the circulation is maintained by an adequate degree of hypertrophy of the right ventricle, and the sharp closure of the valves spoken of, is a more or less constant phenomenon and indicates a strong and competent heart, while at the same time it shows that it is performing an increased task. In all such cases we must remain within the limits of safety and permit nothing that will debilitate or strain the muscular power of the heart, while we attempt to further strengthen it as far as may be possible. This we may hope to accomplish by maintaining and increasing the general nutrition, and by allowing no physical exercise or labor under which the heart fails in its power, from overstrain, that causes the pulse to become weak and fast. Every time, therefore, that exercise is carried to such a degree that the pulse shows the effect of heart strain there has been inflicted a damage which if repeated frequently becomes serious, and sometimes lasting.

For the strengthening of the heart we require in addition to the best possible nutrition the benefits of *carefully supervised* physical exercise. To be effective, the latter must never exceed safe limits, although it should for short periods of time approach this limit. In practice the rules to be followed are very simple. If a patient has a weak and rapid

pulse, this means that his heart is fatigued, and that the limit of safety has been exceeded, no matter how little exercise may have been taken, even if it has not been more, than to rise and dress in the morning. Such a patient must observe absolute rest until the circulation is restored, let the duration be what it may. In some instances it may require several days or weeks, but so long as we do not consider our patient's prospects otherwise hopeless, no further heart strain must be allowed. After the circulation has become good, a cautious trial of exercise may be made; it should, however, be so regulated, that we are sure that we are on the safe side. Thereafter it is increased from time to time, or again restricted, if we see that instead of becoming stronger and more enduring, the circulation shows a tendency to revert to its previous unfavorable state. This is likely to happen from faulty conduct of the patient, who exceeds the permitted limits; it also follows attacks of indigestion, and diarrhoea or upon renewal of inflammatory or other active and progressive changes in the diseased lungs.

Our object demands that we give all the exercise that is permissible, and even to insist upon its being taken with regularity from day to day, while at the same time, we secure intervening periods of rest; this requires strictly individualizing specific directions to our patients, under the general rule, "to take all the exercise they can, without inducing shortness of breath, palpitation of the heart, or marked sensible fatigue."

More particular control of the patient in this respect is had, by observing the pulse morning, noon and night; and immediately after the completion of the permitted exercise.

The kind of exercise must of course be prescribed by the attending physician. For patients who already have a weak and damaged heart, it may be quite enough to let them rise, dress and, after a rest, walk about the room for a few minutes. Others whose hearts are stronger may walk for ten or fifteen minutes upon level ground or upon a piazza and then return to their reclining chair.

Such gentle and greatly limited exercise is first increased by repeating it several times a day, and eventually by increasing its duration; only after the patient can walk upon the level for fifteen minutes to half an hour without overtaxing his heart, should permission be given to slowly ascend stairs or gentle up hill grades.

Carriage riding, for an hour, is then also proper, while later the patient may ride horse-back or perform some mental or manual labor for short

periods of time. As the heart grows stronger and the general nutrition improves, more active and prolonged exercise should be enforced, and unless other contra-indication exists, the patient should now ascend steeper grades, and do this systematically every day; but until the patient has fully recovered, he is limited by the general rule as stated heretofore, and he must be made to remember, that while others may take exercise to a degree that produces fatigue and shortness of breath, *and then rest*, the patient who has pulmonary tuberculosis *must rest before* these symptoms are induced.

Next in importance of the conditions which are influenced by rest and exercise, is the fever; unfortunately this often limits the otherwise permissible amount of exercise. When a patient has fever, all active exercise must be discontinued, however desirable it may be for other reasons. Here we must choose between two evils, and choosing the least of these, we may have to substitute absolute and prolonged rest in bed for the accustomed exercise.

Any one who has carefully observed the temperature and recorded it, as it should be, every two hours during waking hours of the patient, must have noted, that exercise is liable to increase the temperature and that the fever is, as a rule, less under absolute rest. Although exercise, especially if taken out of doors is conducive to better appetite and digestion, this is only true when marked elevation of temperature is not a symptom. With fever the appetite is diminished, the digestion becomes retarded, and often impaired, especially so, when the fever exceeds 101° F., or is maintained above 100° for the greater part of the day. The loss of appetite in a fever patient can not be remedied by exercise; on the contrary the appetite and digestion will suffer still more if exercise results in increasing the fever which is usually the case.

In addition to the circulation, the fever must also enter into our consideration when we adjust the amount of exercise and rest; and we must be prepared at all times to make necessary changes. This we can only do, if we have an exact temperature and pulse record which we inspect frequently, and which must govern the patient in our absence. The regulation of rest and exercise with fever will be further considered when I come to the treatment of fever.

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ORIGINAL CONTRIBUTIONS.

PRIMARY PHARYNGEAL AND LARYNGEAL TUBERCULOSIS, TWO CASES CURED.

BY J. W. GLEITSMANN, M. D., NEW YORK.

As the whole subject of tuberculosis is so ably discussed by the Editor of this journal in all its phases, it would only be reiterating statements already made or to be made in future issues, if the writer should enter into a consideration of the etiology, symptomatology and therapeutics of his subject. Aside from the request of the editor of this journal for a contribution to the same, the two cases whose history will be given are, in the opinion of the writer, of sufficient interest, as regards their severity as well as their successful issue, to deserve a more widespread notice than has hitherto been accorded to them. But a still more cogent reason for the author to present them here was that, in his opinion, they serve as a further additional proof of the still much-mooted question of the existence of a primary tuberculosis of the pharynx and larynx without pulmonary complication.

As the absence of a pulmonary affection in cases of laryngeal tuberculosis, however carefully and scientifically they may have been observed, is often impossible and always difficult to establish, the contention of the presence of the former either in a latent form or its development at a later period, cannot be so easily refuted. But when we consider that tuberculosis has been observed in osseous tissue, the lymphatic glands, the genito-urinary apparatus, without concomitant or subsequent pulmonary trouble, it can *a priori* be very well assumed that such occurrence may also take place in the upper air-passages, which besides are exposed in a far greater degree to the deleterious influences of infection than the organs of the above order.

It was never fully comprehensible to the writer why, even with rea-

soning by analogy alone, not a fourth part of the human body, viz., the larynx, could also become primarily diseased. To remove all doubts and to silence the opponents, it was necessary to prove first the existence of laryngeal tuberculosis in the living, and secondly the absence of pulmonary tuberculosis at a post-mortem. Fortunately, such cases are on record, and among the best known and best observed are those of Demme (1), E. Fraenkel (2), Progrebinski (3), and Orth (4). But it seems hardly fair to throw out all cases supporting our argument, because the patient has not died yet and given an opportunity to science to dissect his body in search for hidden tuberculous foci. Of such cases may be mentioned those of Coghill (5), J. S. Cohen (6), Dehio (7), Lancereux (8), etc.; and, fortunately for the patient and to the great satisfaction of the writer, his two cases also belong to this, viz., the living class. It may be left to the discretion of the adherents to the correlation of pulmonary and laryngeal disease to determine the period of time when the absence of the former allows them to concede the primary character of the latter, similar to the time we usually let elapse after an operation for cancer, before we feel justified to tabulate the case in statistics as cured. But if with a total absence of chest symptoms at all times in both patients a period of two years, after healing of the throat affection, should not be deemed sufficiently long, the time of twelve years, which the other patient has so far passed in perfect health after her recovery from the laryngeal and pharyngeal trouble, ought to meet the demand of the most exacting scientist in considering the laryngeal affection of primary character and independent of some occult and undefinable pulmonary disease. The reader may judge for himself the force of this argument by perusing the history of the two cases, one of which was published before in the *New York Medical Journal*, 1890, and is repro-

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- (1) *Demme*: Ein Fall von primärer Kehlkopftuberculose; Bern, 1883.
 (2) *E. Fraenkel*: Primäre Kehlkopftuberculose; Deutsch. med. Wochenschrift, No. 28, 1886.
 (3) *Progrebinski*: Medycyna, No. 14, 1887.
 (4) *Orth*: Lehrbuch der pathologischen Anatomie, 1887.
 (5) *Coghill*: Transactions Ninth International Congress, 1889, Vol. IV, p. 26.
 (6) *J. S. Cohen*: Archives of Laryngology, Vol. II, p. 103.
 (7) *Dehio*: La France Médicale, 1884, Vol. II, p. 1650.
 (8) *Lancereux*: Annales des mal. de l'Oreille, etc., 1879, Vol. VII, p. 338.

duced here in abbreviated form, and short notes about the other having appeared in the *Transactions of the American Laryngeal Association*, 1898, where the patient was demonstrated to its members:

FIRST CASE.

Woman, 38 years of age, well built, weight 180 lbs., with no hereditary tendency, called for treatment May 14, 1888, on account of pain at deglutition on the left side during the previous two weeks. Inspection showed an ulceration of the size of a pea, covered with greyish-white secretion, situated at the base of the tongue on the left side. Examination of the lungs at that time and at all subsequent periods showed them to be in a perfectly healthy condition. Syphilis had to be excluded, as the patient had never had any symptoms of the disease, was happily married, and had given birth to six children, two of whom had died from croup and four were living and healthy.

Curettment of the ulceration being deemed advisable for diagnostic as well as therapeutic purposes, the scrapings removed and submitted to two independent microscopists showed numerous tubercle bacilli, as did also a piece of tissue excised from the edge of an ulceration a month later. The treatment during the entire course of the disease was confined to curettment of the ulcerations and energetic applications of lactic acid, and, at times, use of the galvano-cautery; all alterative remedies being purposely avoided, so as not to admit any doubt as to the diagnosis.

The initial ulceration improved in the beginning, but in the latter part of June the destructive process extended along the base of the tongue toward the right side. Energetic treatment also arrested it in this locality, but in the beginning of August a deep ulcer was discovered in the posterior portion of the left tonsil. The ulceration was hidden by a flap of healthy tissue, and could only be seen by pushing the latter aside with a suitable forceps. A few days later the lingual surface of the epiglottis became intensely hyperaemic and uniformly thickened, resembling oedema. But on application of a probe no impression was produced, showing that a true infiltration existed. This condition remained stationary during the following month, but, when seeing the patient after returning to the city in the autumn, it was found that she had lost ten pounds in weight and suffered from severe dysphagia. In trying to swallow liquids, the greater part passed through the nose. The lungs were again found to be intact. Scarifications of the infil-

trated epiglottis were next attempted, but without giving relief. By the end of September the whole infiltration of the lingual surface of the epiglottis had melted away, and a large ulceration was visible instead, leaving only a small area of healthy tissue on the free border of the cartilage. On October 1st, ulceration set in on the left palatine pillar; on the 15th of the same month, the remaining portion of the epiglottis was also transformed into an ulcer, and on the 20th the left aryteno-epiglottic ligament became involved. The condition of the patient being now extremely critical, heroic measures seemed justifiable, and all the diseased tissue was scraped away most energetically, without regard to the subsequent haemorrhage, and undiluted lactic acid rubbed in. The patient felt relief from pain the following day, and three days later cicatricial tissue appeared everywhere. Again three days later, October 29th, the patient felt perfectly well, and on the 31st the last eschar disappeared. The patient now weighed but one hundred and sixty-seven pounds.

After this severe and prolonged attack, and its successful termination, two slight recurrences took place—an ulcer appearing in December in the dense hyperaemic left glosso-palatine pillar, and in January, 1889, in the left tonsil; both of which, under similar treatment, healed rapidly without any sequelae.

The patient was seen at different times by members of several societies, who confirmed the condition present at the time and assented to the diagnosis. She made a rapid recovery; and, being at intervals and quite recently seen by the writer, has since been found in a state of perfect health.

SECOND CASE.

Woman, 38 years of age, with a good family history, was first seen by the writer October 29, 1897, after his return from the International Congress, at Moscow, and had been treated up to that time by his assistant since July 15th. In the latter part of June she began to feel a fullness in her throat; her family physician reported to have seen an ulceration in her throat at the time; slight dysphagia set in in the middle of September. At the end of October there was no fever, and a complete absence of pulmonary symptoms, as well as at all later and frequently repeated examinations of the chest, and a loss of weight of eight pounds.

The laryngoscope showed the following condition: The whole free

border of the epiglottis was one honey-combed ulcer, the right arytenoid region was ulcerated and thickened, the right ventricular band infiltrated. Being sent to the hospital, her general condition improved sufficiently under nutrient enemata, etc., to allow the excision of the whole ulcerated border of the epiglottis in five pieces, and of the larger portion of the right arytenoid region, by Heryng's double curettes. The operation was followed by no reaction, no fever, almost no pain, and greatly facilitated deglutition and nutrition. The infiltration on the right side of the larynx extending posteriorly and laterally on the outer (oesophageal) wall of the larynx into the pyriform sinus, made a second curettment necessary, which, especially in the latter region, was accomplished with great difficulty. The wound made by this operation being very deeply located and of considerable extent, healed slowly, but had finally cicatrized at the end of December, 1897. By these operations twenty-one pieces of tuberculous tissue were removed, and the larynx from this time on, with the exception of a slight intercurrent and quickly-healing ulceration of the right arytenoid cartilage, and in spite of the severe subsequent pharyngeal complication, remained in a healthy state until the present time, the infiltration of the right ventricular band having disappeared without aggressive measures, and the right vocal cord being visible the first time in February, 1898.

In January of the same year a suspicious infiltration at the right side of the base of the tongue made its appearance, and, although slight in the beginning, the pharyngeal affection took the greater part of the year to combat successfully, and proved to be more dangerous to the patient than the laryngeal one. On account of tendency to hæmorrhage, at the commencement two submucous injections of 50 per cent. and 75 per cent. lactic acid were made with good temporary result, as the patient felt much better and gained considerably in February and March. Her visits being, consequently, less frequent, it was a source of great surprise and disappointment to find a large, deep ulceration at the base of the tongue near the median line, in the middle of April. In the course of time the whole base of the tongue became involved—one time one part or one side sloughing away, whilst another previously affected cicatrized only to break down anew later on. The suffering of the patient during this period was intense, and the drain on her system brought her very near to a collapse. Her energetic, confiding nature

assisted her to the greatest extent; nutrient enemata, tonics, and insufflations of orthoform, made frequently also at her home, supported her; and, surgically, six curettments, one excision of decayed tissue, two sub-mucous injections of pure lactic acid, and in summer applications of parachlorphenol were made. In the middle of October the lingual ulceration had healed and cicatrized, but during November an infiltration of the left posterior pillar and a small ulcer of the left tonsil made their appearance, but were only of short duration, and at the beginning of December (1898) the pharynx was free from disease, to remain so up to the present day, as repeated and also recent examination confirmed. The patient remains cured, therefore, somewhat over two years, is in perfect health now, and weighs more than before the onset of her affliction.

A few words may be allowed in conclusion. It has been such a common, one might say universal, custom among professional men and in medical societies, where such patients are demonstrated, to throw some doubt upon the diagnosis, either on account of the difficulty of forming it by a mere casual examination, or of the unwonted results obtained, which, it is true to say, are of the rarest occurrence in the practice of a whole lifetime. Although it cannot well be assumed that anybody will be inclined to assert that syphilis, the only affection in question, will be cured by lactic acid, curetting, etc., without mercury or iodide of potassium, all errors in this direction were carefully guarded against by repeated examinations of the scrapings from the ulceration and of the removed tissue by several microscopists, who declared their tuberculous nature to be beyond any doubt. In this direction the writer had the great satisfaction, when one of our acutest and best observers and critics, Dr. Wright (9), acknowledged the careful reports of these cases, preferring them to those of others who brought forth less positive and forcible arguments to sustain the diagnosis. Although not having laid stress on the different features of the treatment, allusion to such was unavoidable; but, as of late some doubts have appeared in the press as to the utility and beneficial action of lactic acid, and quite a large number of laryngologists are still adverse to curetment in laryngeal phthisis, it may be stated here, as the firm conviction of the writer, that a cure could not have been effected—at least in these cases—with any other

(9) *J. Wright*: N. Y. Medical Journal, June 24, 1899.

therapeutic measures, and that without these two remedial agents the patients would have succumbed to their disease.

The reasoning of how much the two cases related here prove the existence of a primary laryngeal and pharyngeal tuberculosis will be left to the reader without any further argument.

TEN YEARS' EXPERIENCE WITH THE TUBERCULINS.

BY CHAS. DENISON, A. M., M. D., DENVER, COLORADO.

About ten years ago, immediately after Koch made known his tuberculin, I commenced the use of it, at first observing his instructions as nearly as possible. I soon learned the following facts:

1. That hospital and very febrile cases, or those wholly unable to exercise, were undesirable patients for this form of treatment.

2. That the dosage and frequency of its administration recommended were too severe.

3. That any increase of intoxication of an already overburdened system, especially in cases with mixed infection, was harmful, and hence any complication as la grippe, measles, or tubercular pleurisy should for the time being interdict the treatment.

4. That no remedial effect can be expected in tissues that are not alive and supplied with circulation; neither could any direct change of abscesses and cavities be expected, nor of mixed infections (as distinguished from pure tuberculosis).

5. That the *local* effect in slightly affected tubercular lung areas was both remarkable and extremely useful as a guide to dosage and prognosis. It was even diagnostic in some cases of affected spots not otherwise detectable. This stethoscopically determined condition was probably due to some increased leucocytosis and stimulated circulation in slightly affected and infiltrated regions, probably involving the bronchial glands and peri-bronchial tissues, so that the sound of the air movement in the tubes was changed. This change was described as a *puerile, broncho-vesicular and higher pitched sound* than existed before the test or treatment. It was then found that the subsiding or softening down of the harsh characteristics of this sound was also a guide for the continuance or pushing of the treatment.

Thus, fortified by these determined facts, close observation enabled me to not only choose the cases chronic or slow enough to be suited to this method, but also to know when to discontinue the treatment, if too

great susceptibility or conditions impossible to remedy should be encountered. Here, then, were some of the necessary precautions which were pre-requisite to the successful solution of this difficult problem. Hence, aided by our splendid Colorado climate, and by whatever aids I could supply, either nutritive or hygienic (to each of which I wish to give due credit), I have been enabled to find many cases peculiarly suited to this additionally immunizing method of treatment, and to obtain results, which I believe would not have been obtained without its aid.

Despite the charges of failure of this specific method of treatment, made by hasty and indiscriminating critics, it is coming more and more to be acknowledged by those physicians who are willing to test the matter, that there is a special and specific stimulation of tubercular living tissue which is characteristic of a healing process. This effect bears a relation to the susceptibility of the affected individual and also to the location and extent of the tubercular infection. For instance, the greatly increased activity of the pulmonary blood circulation, compared with that in the periphery of the body, must intensify the susceptibility and so increase the direct local effect of any such specific. Therefore the first effect, i. e. the response to the smallest doses, should be and is noticed in the lungs in initial tubercular lesions where the irritative or hyperaemic excitement is greatest. To the discriminating diagnostician this local effect is extremely suggestive. The whole course is a new and interesting revelation; and I have wondered, (as I expressed it to a homeopathic physician, whose wife was under my charge), that the "*Similia Similibus Curantur*" fellows did not "catch onto" it. He replied that he thought they had, and afterward kindly sent me a publication, "*New, Old and Forgotten Remedies*," by E. P. Anshutz, giving in a general way, the preparation of "*Bacilinum*" and "*Tuberculinum*," from the use of which some good results were claimed. I no longer wondered that they did not and could not appreciate the full advantage of this immunizing method; for there was neither system nor sense in the preparation of the substances (which are happily carried to an almost unlimited attenuation) known under the terms, "*Bacillinum*" and "*Tuberculinum*." The former is described as "a maceration of a typical tuberculous lung"; and the latter, "of the sputa of tuberculous subjects"—undoubtedly with all or some of the various forms of mixed infection which are found therein.

Excluding the use of crude tuberculin merely for diagnostic purposes, also excluding the tentative trial of all forms when not employed a long enough time (at least one month) to get definite results, the following list includes all those treated by me with any form of the toxin since the crude material was put upon the market some ten years ago. This exclusion, counting in 45 tested with tuberculin for purpose of diagnosis, takes out about one-half as many as there are in this reported list, and the latter embraces probably a fourth of the chronic pulmonary cases seen by me in private practice during that period.

At first we had only the crude "Lymph" or glycerine extract. Then came the successive discovery and trial of Tuberculocidin (Klebs), Antiphthisin (Klebs), Asses' Serum (Mumford and Co.), Antiphthisic Serum (Fisch), Oxy-tuberculin (Hirschfelder), Tuberculinum Purificatum (von Ruck), and last the most refined of these tuberculin products, the Watery Extract of Tubercle Bacilli (von Ruck).

It has not been maintained or pretended that this effort at an increase in artificial immunity was the sole source of benefit sought in any of these cases, for the treatment was used or intended only as an adjuvant to the combined method which especially includes climatic treatment, physical exercise, attention to alimentation, appropriate inhaling method, etc.

(SEE TABLE, NEXT PAGE.)

This is not a list of easy or simple cases. On the contrary some of them seemed to be entirely hopeless unless some additional advantage should be found for them aside from the usual or ordinary methods of treatment. The complications and conditions indicated gravity. Among the former were included the following: Lupus three cases, meningitis two, Bright's disease one, pyo-nephritis one, tubercular kidney two, glandular cases six, joint tuberculosis four, tubercular testicle two, bladder tuberculosis three, and intestinal tuberculosis two. Intemperance was a complication in two or three and contributed to a fatal termination, as did accidental pneumonia in several. The stage of the disease at the commencement of treatment also indicated the gravity of these cases. Of the 213 cases reported in this list 50 were in the first, 45 in the second and 118 in the third stage of tuberculosis as indicated by the pulmonary condition.

I am aware that these records would appear more favorable if reported at the conclusion of treatment, as is usual with most observers. However, the staying qualities of these results—the evidences of acquired immunity—are shown by carrying forward the report to as late a

TABLE OF RESULTS OF SPECIFIC TREATMENT.

Roman numerals—Stage of disease. *Av. yrs.*—Years known to be alive after commencement of treatment.

Specific remedy used.	Now or recently known to be in good health.	Now supposed to be living.	Whereabouts unknown: possibly dead.	Dead: cause in part known	GENERAL RESULTS		
					Disease thoroughly arrested seemingly cured.	Much benefited, immunity increased, life prolonged.	Retrograded or died: possibly of intercurrent causes.
Tuberculin (Koch) 57 cases reported.	I. 7 II. 3 III. 7 Av. 8 1-2 yrs	I. 5 II. 4 III. 9 Av. 2 1-2 yrs	I. 0 II. 1 III. 7 Av. 2 yrs.	I. 0 II. 4 III. 10 Av. 2 1-2 yrs	18	23	16
Tuberculoicin (Klebs) 21 cases reported.	I. 3 II. 2 III. 1 Av. 7 yrs.	I. 1 II. 2 III. 3 Av. 2 3-4 yrs	I. 0 II. 0 III. 5 Av. 1 2-3 yrs	I. 0 II. 0 III. 4 Av. 1 yr.	6	10	5
Antiphthisin (Klebs) 47 cases reported.	I. 6 II. 4 III. 6 Av. 5 yrs.	I. 3 II. 3 III. 11 Av. 1 3-4 yrs	I. 0 II. 1 III. 7 Av. 1 1-2 yrs	I. 0 II. 1 III. 5 Av. 2 1-2 yrs	17	19	11
Asses' Serum (H. K. Mumford) 3 cases reported.	I. 0 II. 0 III. 1 Av. 3 yrs.	I. 0 II. 0 III. 1 Av. 1 yr.	I. 0 II. 0 III. 0	I. 0 II. 0 III. 1 Av. 2 yrs.	0	2	1
Antiphthisic Serum, T.R. (Fisch) 11 cases reported.	I. 1 II. 2 III. 1 Av. 3 1-2 yrs	I. 0 II. 1 III. 1 Av. 2 yrs.	I. 0 II. 2 III. 1 Av. 1 1-3 yrs	I. 0 II. 1 III. 1 Av. 1 yr.	3	5	3
Oxy-tuberculin (Hirschfelder) 3 cases reported.	I. 0 II. 0 III. 0	I. 0 II. 1 III. 0 Av. 2 yrs.	I. 0 II. 0 III. 1 Av. 1 yr.	I. 0 II. 0 III. 1 Av. 1-2 yr.	0	1	2
Tuberculin Purif. (von Ruck) 26 cases reported.	I. 5 II. 1 III. 2 Av. 3 3-4 yrs	I. 3 II. 2 III. 4 Av. 1 1-2 yrs	I. 0 II. 0 III. 1 Av. 1 yr.	I. 0 II. 0 III. 8 Av. 1 yr.	9	9	8
Watery Extract (von Ruck) 45 cases reported.	I. 13 II. 6 III. 9 Av. 1 2-3 yrs	I. 2 II. 2 III. 5 Av. 1 1-4 yrs	I. 0 II. 1 III. 2 * Av. 1 yr.	I. 1 II. 0 * III. 4 Av. 3-4 yr.	18	22	5 †

*None of these were completed cases, 3 died of pneumonia, 1 of grippe, 1 from results of dissipation and all some months after treatment.

†Previous column should rightly have benefit of 3 of these.

period as possible. Of course the accidents and uncertainties of existence are more liable to come to these impaired lives, and as expressed by another, these consumptives "all eventually die!" This emphasizes the good returns of the guarded treatment with even the crude tuberculin some eight or ten years ago, of which class (57 patients) 17, or 30 per cent., are now living in good state of health (including some of my best results). While of the 94 patients of the combined classes treated with the purified forms of tuberculin (tuberculoceidin, antiphthisin and tuberculinum purificatum), 30, or 32 per cent., are living in good condition. Of the 45 watery extract cases, 28, or 62 per cent., are living in apparent immunity. This is a very good showing for the later refined method, even allowing for the very much shorter time which has elapsed since treatment was concluded.

Reduced to percentages and lumping similar methods for comparison we have the following table:

TABLE OF COMPARISON BY PERCENTAGE.

Preparation used.	Disease arrested, or apparent cures	Much improved. Immunity rela- tively increased.	Retrograded: or died from vari- ous causes.	Approximate time since treatment.
Tuberculin	32	40	28	7 yrs.
Tuberculoceidin Antiphthisin Tuberculinum Purifi- catum	33	40	27	4 yrs.
Asses' Serum Antiphthisic Serum	30	40	30	3 yrs.
Watery Extract	40	49	11	1 yr.

The excellence of the results among those known to be living is shown by the fact that six of them have since married (though not with my advice) and two married women have since borne children. Two of this list are known to have had their lives insured in reputable companies. Six of them are now known to be living in good health back in their Eastern homes, while a majority are living in the vicinity of Denver.

many of them prosperous citizens engaged in business occupations. It is right to state that the ambulatory character of this class of patients, who were journeying for their health, not expecting to settle down permanently in any one place, explains, in part at least, why so many of these cases are lost sight of though perhaps living.

With reference to the conclusions which may be drawn from the comparative table (by percentages of results) the axiom ought to be borne in mind, that the better or more refined the preparation of tuberculin the greater is the temptation to try to help hopeless or incurable cases. My experience has undoubtedly been influenced by this risk.

The number of cases treated by the animal serums was not large enough to warrant any conclusions especially favorable to that method. In fact, there has been nothing definitely determined, that I know of, (as to the dosage of animals and the requisite time and technique in obtaining from them tuberculous or anti-tuberculous serum) to entirely disprove the claim that the healing powers conferred are due to a transmitted tuberculin rather than to an antitoxin supposedly created outside the patient's body.

In conclusion I am pleased to have taken part in the conception of this form of tuberculin, *the watery extract*, which as a substitute for Koch's emulsion—the tuberculin R.—has proved itself the most perfect and satisfactory aid to specific immunization in tuberculosis thus far discovered.

Denver, Colorado, Feb. 20th, 1901.

HOME TREATMENT OF TUBERCULOSIS.

BY LAWRENCE F. FLICK, M. D., PHILADELPHIA.

By home treatment of tuberculosis I mean treatment of the disease at the place where it was contracted in contradistinction to treatment in a climate selected for its curative qualities. In the past the teaching has been that outside of climatic treatment there was no hope for the consumptive; but fortunately this doctrine so inhibitive of progress is gradually giving way to a more encouraging one which proclaims the curability of tuberculosis in any climate.

For the cure of tuberculosis it is necessary: 1st, to restore the physiological functions of the body to a normal state; 2nd, to bring about a state of hypernutrition; and 3rd, to establish immunity. For the accomplishment of these three results, ease and comfort of life, plenty of good food, plenty of fresh air, and military discipline in the mode of life of

the patient are necessary; and they must all extend over a period of from three to five years. Every act and every element in the patient's life must be regulated with a view of conserving strength and creating new resources for the conflict against the disease.

Vastly the majority of consumptives are poor people, who prior to contracting the disease were unable to keep their health up to the normal standard. They live and have lived under bad environments, and their habits of life have been and are at variance with the laws of health. Their families like themselves are poor, and if any money can be raised with which to make a struggle for life the amount is necessarily small. For such people more can be done in their home, bad as their homes are, than away from home, because their limited means will get them more nourishing food and will get it for a longer period of time at home than away from home, and the defects in environment and mode of life can in some measure be corrected.

Home treatment of tuberculosis may be divided into what nowadays is called closed treatment and open treatment. By closed treatment is meant treatment in a sanatorium, in which the patient is shut off from the world and is subjected to strict discipline. By open treatment is meant treatment at the patient's home, among his relatives and friends, with possibly some occupation and with considerable liberty.

Closed treatment is the ideal treatment for persons suffering from tuberculosis. One of its chief advantages is in that it enables the physician to prevent in his patient the intercurrent of complications by excluding from the sanatorium all persons suffering from colds, influenza, and other diseases of the respiratory tract that may be epidemic outside. It also facilitates discipline and places the physician in closer touch with his patient than is possible with open treatment. Wherever closed treatment has been tried, irrespective of climate, it has given good results. At present it is yielding from twenty to forty per cent. recoveries according to the stage of the disease at which patients are taken. In selected cases it would give even better results. Closed treatment will undoubtedly be the treatment of tuberculosis of the future.

For the present, however, it is what may be called open treatment at home which merits attention of the general practitioner, because much can be accomplished by it, and it is the only treatment which is practicable at the present time for the average case. Neither public sentiment nor professional opinion will as yet warrant placing closed treatment on a sound financial basis.

An essential preliminary to successful treatment of tuberculosis is

early diagnosis. The general practitioner must be a little more on the alert in looking for tuberculosis than he has been in the past. He should not wait until a cold, an attack of influenza, or pneumonia reveals to him what should have been discovered before such complication had set in. In this connection it is well for him to bear in mind that uncomplicated tuberculosis sets up very few symptoms, and may produce none that attract attention. Indigestion is one of the earliest symptoms. The lungs and the stomach are both supplied by the pneumogastric nerve, and injury to the lungs almost invariably sets up stomach symptoms of some kind. For this reason every case of indigestion should in the mind of the physician raise the question of tuberculosis and merits a careful investigation for its ultimate cause. A physical examination of the lungs should always be made in a person who persistently suffers from indigestion. Loss of weight is an early symptom. It usually follows in the wake of indigestion and practically always precedes the development of a cough. Unfortunately it does not always arrest attention, as few people weigh themselves systematically, and without weighing the loss of ten or fifteen pounds is apt to go unnoticed in people of average weight. Lassitude, loss of appetite, and a tendency to feel cold which does not amount to a chill, are early symptoms, but rarely induce people to consult a physician. Cough in the incipient stage of tuberculosis seldom amounts to much until the tuberculosis becomes complicated with something else such as a cold or influenza. It may not occur at all until the complication sets in and when it does occur is very mild and takes place only upon change of position, upon exertion, or possibly after eating or drinking. Such a cough rarely brings a patient to the physician. The detection of incipient tuberculosis is therefore difficult, from the very nature of things. The family physician, however, could more frequently unearth early cases than he does, had he a clearer conception of what constitutes incipient tuberculosis and were he more on the lookout for it. A very good plan is to have physical examinations made of all those members of a household who have been exposed to tuberculosis by the presence of a case in a house or in the family, and who are below normal in health. When there is expectoration by such persons the sputa should be examined. I have in recent years discovered incipient cases of tuberculosis in this way when I little suspected their existence.

Given a case in which there is a history of indigestion, loss of weight, a feeling of lassitude, capricious appetite, slight chilliness or creepy feelings, occasional cough especially upon change of position, an abnor-

mal daily range of temperature, the temperature either going a little above normal or a little below it, a disturbed circulation as manifested by an increased pulse rate, an increase in expiratory murmur and an impairment of resonance over a circumscribed area of the lungs, and we have a case of incipient tuberculosis of the lungs without doubt. There need be no hesitation in making a diagnosis in such a case no difference how mild the symptoms. So far as my observation goes the general practitioner makes too light of this symptom-complex, and never thinks of associating it with tuberculosis. To him tuberculosis needs to be a savage fatal disease, and he does not associate the name tuberculosis with a case until the patient is on the brink of the grave.

When a case of tuberculosis has been diagnosed the next step in order is to fully acquaint the patient with the nature of his ailment. It is not possible to treat a person properly for tuberculosis unless he knows and fully understands what is the matter with him. The rules which it is necessary to lay down for a tuberculous patient will not be obeyed unless he knows why those rules are made. In the matter of prophylaxis, for instance, intelligent co-operation can only be given when the patient knows wherein the danger lies. Moreover unless a patient appreciates the gravity of his ailment he will stop the treatment as soon as he feels a little better, greatly to the prejudice of his recovery. No harm ever comes from telling a patient that he has tuberculosis and explaining to him what it all means. The information may shock him a little at first, but he soon recovers from the shock and buckles on his armor to fight for his life. With the knowledge which he has gained he becomes a good patient whereas otherwise he would have been an indifferent one. He may be assured that with modern treatment his chances of recovery are good. If the disease is not far advanced he will note rapid improvement from the start, and he will gain courage and become an enthusiast in his own cause.

When a patient has been fully informed about the nature of his ailment he should next be made to understand thoroughly that successful treatment means a persistent continuous struggle for a long time, possibly for a period of from three to five years. A little bit of wisdom, which has come to me by experience, is that a tuberculous patient is not always cured when he appears to be cured, and that treatment should be kept up for a long time after the patient appears to be well. Since I have learned this lesson my permanent results are better than they were before.

With the patient properly instructed about the nature of his ailment

and the length of time required for a cure, it is next in order to lay down the routine of life. This must be very complete. Everything which the patient does, everything he eats and drinks, his home—its sanitary arrangements, his work, recreation and rest, all must be passed in review by the physician. A good plan is to begin with the food. Inquiry should first be made into the diet which the patient has been using. When he has told all about what he eats and drinks, then the medical adviser should tell him first, what not to eat and drink, and then what to eat and drink. With many patients certain articles of diet will have to be stopped. As a general proposition stimulants had better be stopped and also pastry of every kind. When it is found that the patient has poor digestion only one meal of solid food in every twenty-four hours should be advised. In all cases large quantities of easily digested food should be commended. From three to six quarts of milk a day and from six to a dozen raw eggs a day should be insisted upon to be taken. Vegetables, fruit and nuts should form part of the daily routine diet. Instructions should be given about the intervals at which food should be taken, the manner in which foods should be kept and prepared, and the condition in which foods are most easily digested. Eggs, for instance, should not be used unless they are absolutely fresh. Milk should be carefully selected, sterilized and kept in sterilized vessels. Unless all these minutia are entered into, mistakes in diet will be made by the patient which will prove disastrous to forced feeding. Even intelligent patients will not think of such details if left to their own resources. When, in spite of great care in the selection of food, forced feeding is not well borne, artificial digestive aid should be given with pepsin, pancreatin, caroid, hydrochloric acid, diastase and such like preparations.

When the food question has been carefully gone over the air question should be taken up. Abundance of fresh air night and day should be insisted on. During the day the patient should rest in the open air and at night he should sleep with his windows open. This should be insisted on even during cold weather. The body must of course be kept warm by clothing. Unless there is at all times an abundance of fresh air for the patient, forced feeding will prove unsuccessful, as oxidation is an essential stage of the metamorphosis of food into tissue. Moreover, there is nothing so poisonous to a tubercular subject as rebreathed air. All these matters should be fully explained to the patient and the subject of how the proper amount of fresh air can be obtained for him under his peculiar environments should be carefully gone into. Even in the

humblest home in the small streets of a city a way can be found of giving the patient plenty of outdoor air. The old bugaboo of draughts need not be taken into consideration in planning for fresh air, so long as the patient is properly protected by clothing. Sitting wrapped up in an easy chair in the yard, on the pavement, on a flat and even on the roof are ways in which the patient may be given rest treatment in the open air. If there is no other way the patient may be seated in a room with the windows all open. Whatever the method, out-of-door air without fatigue to the patient must be insisted upon.

After the questions of food and air have been disposed of the mode of life of the patient should be dealt with. If there is activity of the disease the patient should be sent to bed and kept there at absolute rest. If the disease is incipient or if activity has been arrested, moderate exercise may be advised. When the temperature has become normal even occupation may be commended. All of these matters should be definitely determined for the patient by the physician. Nothing should be left to the judgment or impulse of the patient. A regular time should be assigned to everything which the patient does. He should have at least eight hours sleep and he should have it during the night. He should have rest during the day, more or less, according to his condition, and the time for taking such rest should be fixed. There should be no dissipation, no excesses, and no overexertion. As a rule tubercular patients should not indulge in amusements which require great exertion, which keep them up at night, or which necessitate presence in crowded halls or a polluted atmosphere. A single overexertion, one act of dissipation, or a few hours in a crowded, badly ventilated hall, may turn the tide from recovery to fatality. Strict military discipline should be introduced into the patient's life. He should have but one object in life, and that to get well. Whatever militates against this should be foresworn.

As to medication in the treatment of tuberculosis, a great deal can be accomplished by it if drugs are judiciously and intelligently used. The fundamental principle underlying drug treatment should be: Whatever helps nature and builds up is good, and whatever obstructs nature and breaks down is bad. No drug should be allowed to go into the stomach which might disturb or interfere with digestion. No drug should be administered by any method which might cripple or obstruct the function of any organ of the economy. Opiates, stimulants, and depressants, all should be used cautiously therefore, and only when there is a positive indication for them. When any organ in the economy is embarrassed by the disease artificial aid should be given to that organ, in-

directly if possible, and directly if necessary. Every effort should be made to put the functions of the entire organism into a physiological condition. Drugs which, while helping the function of one organ, prejudice that of another should as far as possible be avoided. Old fashioned cough medicines should be eschewed. Antidiaphoretics had also better be avoided. It is surprising how well one can get along without these when little details in the general management of the patient are carefully looked after. For years I have practically discarded the use of opiates and antidiaphoretics in the treatment of tuberculosis and I can truthfully say that I do not need them.

There are many drugs which empirically have been found to be useful in the treatment of tuberculosis, and in the use of which every physician should endeavor to become an adept. Foremost of those, according to my experience, are the iodine compounds. By inunction with a solution of some of the rich iodine compounds I have increased my power to deal successfully with tuberculosis fully fifty per cent. over what it was before I began to use these drugs. The iodine compounds which may be used by inunction are iodoform, europen, iodol and aristol. All of them are soluble in olive oil and cod liver oil and all break down readily thus giving off their iodine. The richest of them is iodol, which contains 89 per cent. iodine, but unfortunately it breaks down very readily, and is apt to decompose before it can be used by the patient. After considerable trial I have discarded it for this reason and have of late years confined myself almost exclusively to the use of europen which in solution will hold together for some weeks. Possibly a way may be found of keeping iodol in solution. I use these iodine compounds by inunction, because I thereby get an even continuous iodine effect without in any way interfering with the functions of the digestive tract. Other effective methods of using iodine may be found and I am inclined to think that inhalation offers a field worthy of further cultivation. Of the many rich iodine compounds there are deserving of careful study the iodide of sulphur, tetra-iodophenolphthalein or nosophen, di-iodoresorcin-mono-sulphonate of potassium or pierol, and iodophenin.

Creasote and its various compounds and derivatives have likewise earned for themselves a permanent place in the armamentarium for the treatment of tuberculosis. For reasons of economy I use almost exclusively the pure beechwood creasote and I have no reason to be dissatisfied with it. I give it in hot water before meals in gradually increasing doses until a maximum dose of fifty drops three times a day is reached. If the patient bears it well I continue this dose indefinitely. I do not use

creasote in incipient cases and discontinue its use when all symptoms of pus-organism complications have subsided.

Among the many drugs which can be used for building up purposes there are deserving of special notice: strychnia, arsenic, phosphorus, digitalis and iron. Strychnia should be used lavishly in early stages of tuberculosis and in sub-acute and chronic stages of the disease. In the use of arsenic great circumspection should be exercised so that no interference with the function of any organ may occur. Arsenic readily upsets the stomach and may disturb the action of the kidneys. It is, however, a most valuable remedy and is well worth a trial in every case. A good plan is to combine it with pepsin and tonics of various kinds. Phosphorus in its various combinations and derivatives can be used to great advantage at one time or another in almost every case of tuberculosis. Digitalis should always be thought of in connection with tuberculosis, but should only be used when there is defective heart action, and never when the heart is already straining under excessive burdens. Iron in its many combinations is a desirable remedy in all cases of tuberculosis in which there is a depraved condition of the blood. Vegetable tonics, stimulants, cholagogues, stomachics, antacids and antifermentatives or intestinal antiseptics should always be kept in mind in the management of a case of tuberculosis and be used when indicated.

Wherever and whenever a drug can be used to correct a fault or supply a defect in the function of any organ of the body it is good practice to use it. No drug should be used, however, except when there is a positive indication for it.

The special treatments of tuberculosis, such as the pneumatic cabinet, the serum, the vapor inhaling and the hydro-therapeutic, are not applicable in home treatment. They are, moreover, too expensive for people of limited resources. Fortunately they are not essential for cure of the disease. Under the plan of treatment just outlined cases can be cured in the humblest homes even of crowded streets in cities.

One of the greatest difficulties encountered in home treatment of tuberculosis, especially in open treatment, is the frequent intercurrent of complications, such as colds, influenza, and pneumonia. It is practically impossible for a tubercular subject, who associates promiscuously with others, to pass through the Fall, Winter, and Spring, without getting one, two, or three attacks either of cold, influenza or even pneumonia. These attacks are exceedingly trying and frequently are followed by a recrudescence of the tubercular process. The only precaution that can be taken against them is to instruct tubercular patients

about the contagious nature of cold and influenza, and advise them to keep away from persons who have such ailments. When a complication has been established the patient should be put to bed the moment he shows the first symptoms. Vigorous treatment should be applied to it until it has been completely vanquished. Great care should be exercised not to mistake symptoms of the complication for symptoms of the tubercular process, and in consequence of such a mistake to stop the treatment of the complication long before it is well. Such mistakes are easily made, and when made are apt to lead to serious consequences, because the patient will be allowed to go about when he should be kept in bed.

The physician must not allow himself to be discouraged by the occurrence of such complications, as he can feel pretty well assured that a few weeks rest in bed will see his patient as well off, at least, as he was before the complication had set in. The danger of recrudescence is much less when the patient is in bed than when he is up, and for this reason, it being of the greatest importance that recrudescence in the tubercular process should be prevented, absolute rest in bed should always be insisted on until all activity of the complication has subsided.

Frequently with the complications of colds, influenza, and pneumonia, or in their wake, comes a still more serious complication in the form of pyogenism. Streptococci and staphylococci readily fraternize with the tubercle bacillus, and when they do a train of symptoms and a downward tendency sets in which taxes our resources and skill to the utmost. High fever, sweats and rapid emaciation come with this condition, and unless soon checked or ameliorated, lead to a fatal termination. In trying to meet these symptoms one should always bear in mind that they are due to pus-producing organisms and not to the tubercle bacillus. High temperature should be kept down, but not with depressants. Quinine and small doses of phenacetine are drugs worth trying. Hydrotherapeutics has a legitimate place here. Whatever else is done the natural resources of the economy must not be lost sight of, and for this reason the digestive tract should be carefully looked after and an abundance of easily digested food supplied to the patient. In my own experience creasote and its congeners has given the best results in this condition. I have no experience with antistreptococcic-serum.

With the line of treatment which I have briefly outlined my results during recent years have been quite satisfactory. In looking back I can see that the improvement in my results has kept steady pace with the growth of my experience and the development of my method of deal-

ing with the smallest details of my patient's daily life. My results with home treatment during the past six years are approximately indicated by the accompanying table, computed from my case book. In preparing the table I have only used cases which were under treatment for a period of not less than two months. I have included among the cases used, advanced cases if they lived over two months and I have excluded a number of cases which simulated tuberculosis so much as to have been diagnosed as such by other men. By the word "cured," in the table, I mean cases in which the patient has been able to resume his usual occupation for at least a year without having had a recrudescence of the disease. By the words "disease arrested" I mean cases in which there has been no activity of the disease for a considerable period of time and where the patient has been able to resume his avocation, but where the time has been too short to warrant the use of the word cure. By the words "very much improved" I mean cases in which there has been an increase in weight, an arrest of activity, and a restoration of a fair condition of health with a resumption of usual occupation in some cases, but where there has been a recrudescence of the disease of minor severity or where the case has passed from under observation at too remote a period to warrant a conclusion. By the words "temporarily improved" I mean cases in which there has been a very marked improvement, as shown by decided increase in weight, arrest of the disease for a considerable period of time, and a prospect of recovery, but in which for some reason or other a fatal recrudescence of the disease has set in. By the words "not improved" I mean cases in which there has been very little increase in weight and a mere amelioration of the symptoms of the disease.

TABLE.

Cured.....	18 per cent.
Disease arrested.....	10 per cent.
Very much improved.....	26 per cent.
Temporarily improved.....	19 per cent.
Not improved.....	27 per cent.

Of the cured cases there has been an average increase in weight of a fraction less than 21 lbs. The largest gain has been 40½ lbs. and the smallest gain has been 4 lbs. The four patients who made the largest gains averaged 38 lbs. apiece. Of the patients which I have classified as having had the disease arrested there has been an average gain of 12 lbs. The largest gain among these has been 26½ lbs. and the smallest

2½ lbs. All of these will probably recover. Of the cases which I have designated very much improved there has been an average gain of 7½ lbs. Of these the largest gain has been 20½ lbs. One patient lost 11½ lbs., but in all other respects has apparently recovered. Of the cases which I have set down as having temporarily improved there was an average gain of 8½ lbs. The largest gain was 33 lbs. and the smallest 1½ lbs. Nearly all of these cases at one time promised well for recovery, but after considerable period of time during which the disease appeared to have been arrested a fatal recrudescence set in. The case in which 33 lbs. had been gained terminated quite suddenly in peritonitis. Many of these cases might, I think, have recovered if the patients had been under better control and the treatment had been kept up more continuously.

Of all the cases which form the basis for this paper, approximately 15 per cent. applied for treatment in the incipient stage. In all the others there was softening and in many there were cavities. The majority of those which are set down as not having improved were far advanced in the disease when they applied for treatment.

ORIGINAL TRANSLATIONS.

ON THE RELATIONSHIP OF SCROFULA TO TUBERCULOSIS*

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However much a paper on the relationship between scrofula and tuberculosis might arouse general interest, I have my doubts as to whether the representative of a purely theoretical specialty is the most suitable medium for its presentation. I will say, however, that the goal at which I have aimed would not permit a lecturer to allow his eyes to stray from the view-points of practical medicine. If in spite of my scruples I resolve to treat of this subject on this occasion, I hope that what I am about to say will bear the proof of how I have striven to follow the line of conduct required in endeavors of this sort.

The task is unmistakably an especially difficult one to carry out, for the reason that the etiological point of view, if rigidly followed, is to a certain extent in opposition to a clinical comprehension, which has not only come down to us from antiquity, but which—at least in the opinion of many—is still reinforced by the facts of today.

*Translated for the Journal of Tuberculosis from *Allgem. med. Central-Zeitung*, Dec. 29, 1900.

Since Koch's momentous discovery, we note all too distinctly, that in the camp of the hygienists, as in that of the pathologists, the term *scrofula* is used with ever decreasing frequency, so that today we seldom hear it (1).

If, despite this, the word ventures to modestly appear, it is promptly relegated, with a sympathetic shrugging of the shoulders, as a general term of ominously equivocal significance which has fortunately been thrust aside by the advance of bacteriology.

And truly, whoever has once grasped the saving thought of the unity of such dissimilar effects of the tubercle bacillus (2), is no longer able to free himself from its power. For we owe it to the results of etiological investigation that the knowledge which individuals like Laennec, endowed with genial intuition, acquired sixty years ago, rests to-day on scientifically impregnable grounds.

Since Koch in 1882 communicated the fact that the inoculation of scrofulous tissue elements is followed by the phenomena of tuberculosis—just such as are caused by the transmission of tuberculosis proper,—and since the validity of this claim was confirmed by a multitude of investigators, no need has been felt to radically differentiate processes which agree so thoroughly as to cause and action. It is true that it has been desired to more closely identify them, in regard to the phenomenon of caseation, and the accompanying find of miliary nodules with the structure of typical tubercles.

But the proof that not only were the same micro-organisms to be found in each disease, but that by means of pure cultures these bacilli, inoculated into animals, could produce foci which resembled both tuberculosis and scrofula, removed any doubt that both processes essentially agreed in their nature.

Light was thereby shed upon one of the most important localizations of scrofula, the glandular swellings, especially those of the cervical region, which had been from antiquity the most striking characteristic of the entire malady, and had served as its nucleus. Light was shed

(1) In the majority of works on both medicine and surgery, we already seek in vain for a definition, or even a mention of the symptom-complex of scrofula. Some writers limit themselves to the traditional, purely theoretical conception—mere circumlocution which never makes the reader any wiser.

(2) Naturally without detriment to the as yet unexhausted possibility that the presence of other micro-organisms may contribute to the extensive differences in the reaction of the tissues attacked by "mixed" or "secondary" infections.

upon the nature of the "lymphoma," the anatomical characters and transformations of which had been so masterfully described by Virchow in his "*Onkologie*" (3).

Once the tuberculous nature of these glands is established, we cannot do otherwise than assume that the regional lesion through which these glandular tumors are called into being, must owe its origin to this same bacillus. For the experience at once forces itself upon us that those very glands are attacked, where the special area of ramification of afferent vessels is most exposed *to contamination with the bacillus*.

Starting from the tuberculous nature of these secondarily attacked organs, otherwise the "inner line of defense" of our bodies, it is next in order to furnish proofs for the similar nature of those affections which play a primary part in the skin and mucosa—the "outer line of defence."

To perform this task is indeed much more difficult. The germs are not circumscribed in a lymph-node, and so heaped together that they could not escape recognition, but are scattered over an equally extended surface. Upon such an open area the virus must be constantly shifting about, and the danger is always present that it may escape detection after a longer or shorter time. The bacilli may be carried away by the secretion of a moist eczema, or wiped from the skin by the clothing. They may also be dislodged by the current of the wind if they lie upon the surface of the catarrhal mucosa at the orifice of the respiratory and digestive tracts.

Nevertheless within the past few years so many kinds of inflammation of the surfaces, the nature of which had been in dispute, have been shown by decisive bacteriological findings to be tuberculous, that the etiological unity is in a measure complete. For at last we know to a certainty that the atrium of the virus is to be found in the dermatitis, conjunctivitis, etc., which are inseparably associated with that caseation of the lymph glands, concerning the etiological relation of which darkness had hitherto prevailed. Therefore we must avoid errors in connection with the interval between the two processes and must take into account the possibility that the point of entrance may have healed long before the development of the glandular alteration.

There exists undeniably a considerable difference between the receptivity (and the therewith associated disposition to disease) of the skin on the one hand and the external mucous membranes on the other. The first named when intact is as good as impervious to the bacillus. If

(3) Bd. II, p. 582.

the virus is inoculated in the skin, the anatomical conditions offer far greater resistance than is the case of the mucosa. In the case of permanent enlargement of the cervical glands, a safe general rule would be to first assume that the primary lesion is seated in some one of the mucous membranes of the facial cavities, the air passages, etc.

Despite the unfavorable conditions for inoculation which prevail in the skin, observations are upon record in which caseation of the cervical ganglia was called forth by some undoubted cutaneous process. Thus Deneke (4) saw a tuberculous lesion in the scalp followed several weeks later by caseation of the cervical glands.

In this connection we naturally think of lupus of the skin, although this affection usually begins at a later period than does scrofula. From its histological structure, lupus was recognized as a tuberculous affection by Friedländer (5) long before the discovery of Koch's bacillus.

In lupus we see the skin—in contrast to the resistance offered by the normal integument—become the soil for typical tuberculosis. The solution for this apparent contradiction is, however, not difficult, if we bear in mind that under certain circumstances the bacillus remains for a long time in contact with the skin; so that opportunity is offered for the micro-organism to penetrate to a certain distance, either by way of the sweat and sebaceous glands or through macerated epidermis. Furthermore the germ might occasionally enter through minute wounds.

Such a possibility leads us naturally to the consideration of the many forms of injuries of the external integument so often encountered in little children. The slight disposition to heal on the part of these unnoticed solutions of continuity has always served as a particularly trustworthy sign of the scrofulous quality, or at least substratum of the bearer.

But it is only since we have been furnished with the infallible reagent of the bacillus that we have succeeded in collecting an ever increasing number of cases as definitely belonging here. Nothing is more convincing in this connection than the form of tuberculosis associated with circumcision of the new-born. Lindmann (6) succeeded in repeatedly establishing the fact that the small wound in the foreskin of the nursing had been sucked by a consumptive. What wonder if

(4) *Deneke*: Deutsch. med. Wochenschrift, 1890, p. 262.

(5) *Karl Friedländer*: Ueber locale Tuberculose. Volkmann's Vorträge, No. 64. Untersuchungen über Lupus, Virchow's Archiv, Bd. LX, p. 15.

(6) *Lindmann*: Ein Beitrag zur Frage von der Contagiosität der Tuberculose. Deutsch. med. Wochenschrift, 1883, p. 442.

there followed, under these circumstances, a suspicious ulcer of the penis, enlargement and caseation of the inguinal glands, and in one case acute general miliary tuberculosis?

Much more frequently, by reason of the laxity of the submucous tissue, do we find the association of the so-called catarrhal swelling with enlarged cervical glands. We should not feel surprised to learn that an eight-months' old nursing with obstinate ozaena, in the nasal secretions of which Demme (7) found tubercle bacilli, and in whom were found post-mortem several ulcerated areas in the nasal mucosa, had also presented at the same time a swelling of the cervical glands and had finally succumbed to tuberculous meningitis. This observation justly excited much attention, because Demme was able to prove that the nasal affection of the hereditarily sound infant had developed after a chance contact with a tuberculous subject in whose family he had been received.

In this connection I think of a locality to which far less attention has been paid than it actually deserves; the alveolar process of the jaw, the gum and the teeth. Since Baginsky (8) and others have noted tuberculous alterations in these hardly suspected regions; since Doutreloup (9) called attention to small wounds in these localities which often serve as ports of entry, it has become indicated with certainty that in swelling of the submaxillary glands certain defects in the teeth or alveoli must be included in this pathogenic category.

Aside from such localities of invasion as mucous surfaces which have not only been deprived for a considerable interval of their epithelium, but have themselves alternately become tuberculous at a later period, there should also be considered another method of infection in connection with mucous surfaces which could be excluded so far as the skin is concerned. We refer to the questionable faculty of taking up the virus in an unimpaired condition.

A quality of this sort which forces us to assume the existence of a process which may be termed "infection without visible port of entry," has long ago been placed by experimental research beyond the possibility

(7) *Demme*: Zur diagnostischen Bedeutung der Tuberkelbacillen für das Kindesalter, Berl. klin. Wochenschrift, 1883, p. 218.

(8) *Baginsky*: Tuberculöse Ulceration des Zahnfleisches und der Tonsillen. Berl. klin. Wochenschrift, 1887, p. 891.

(9) *Doutreloup*: Ueber Haut- und Schleimhaut-Tuberculose. Deutsch. med. Wochenschrift, 1892, p. 1033.

of doubt. In regard to the digestive tract Orth (10), Klebs (11), Baumgarten (12) and others have shown that bacilli are not only able to penetrate within the uninjured mucosa of the intestine, but even to traverse the entire wall, without causing any perceptible injury (13).

In regard to similar permeability of the lung tissues—whereby the occurrence of apparently primitive tuberculosis of the bronchial glands would be explained,—important objections have recently been raised against such a possibility. Buchner (14), however, once demonstrated that the lung parenchyma was permeable for much coarser micro-organisms, for example the bacillus anthracis, and the recollection of this fact should make it impossible for us to escape the conclusion that the smaller tubercle bacillus could penetrate as far as the afferent vessels of the hilus of the bronchial glands without prejudice to the tissues traversed. Cornet (15) convinced himself that the nasal mucosa of guinea-pigs permitted the passage of bacilli which had been rubbed upon it, and that in this way typical infection of the sub-maxillary glands was produced. The objection that it would be unjustifiable to draw conclusions in regard to mankind from such experiments, is rendered invalid by an observation of H. Kossel (16) which has been followed by others of the same sort. This author found in the nasal mucosa of a nine year old girl a large number of tubercle bacilli. Although this mucosa when examined by the microscope appeared to present no trace of any form of injury, the child was attacked by fatal tuberculosis of the lungs and brain.

(10) *Orth*: Experimentelle Untersuchungen über Fütterungs-Tuberculose. Virchow's Archiv, Bd. LXXVI, p. 217.

(11) *Klebs*: Allgemeine Pathologie, p. 236.

(12) *Baumgarten*: Ueber die Uebertragbarkeit der Tuberculose durch die Nahrung. Centralbl. f. klin. Med., 1884, p. 225.

(13) New experiments in feeding which Max Neisser (Ueber die Durchgängigkeit der Darmwand für Bakterien. Zeitschrift f. Hygiene, Bd. XXI, p. 482) has carried out, seem to contradict this assumption. But in view of these positive results the question is justified as to whether, in the experiments of the said author, the contact of the virus was sufficiently prolonged and intense to render possible an action beneath the surface.

(14) *Buchner*: Ueber den experimentellen Nachweis der Aufnahme von Infektionserregern aus der Atemluft. VII. Cong. f. innere Medicin.

(15) *Cornet*: Experimentelle Untersuchungen über Tuberculose. Verhandlungen des VII. Congresses für innere Medicin, p. 299. Demonstration von tuberculösen Drüzenschwellungen nach Impfungen von Tuberkelbacillen bei Meerschweinchen. Centralb. f. Chirurgie, 1899, No. 29.

(16) *H. Kossel*: Ueber disseminirte Tuberculose. Charité-Ann., XVII.

The same permeability is possessed by the tonsils, and strange as it may sound to you to-day, these organs were held only recently to be immune.

Supported by a plethora of positive experiences, I nevertheless cannot too strongly antagonize such optimism. For at least in the presence of a considerable number, perhaps half of all consumptives, the tonsils are invested with typical miliary nodules, and correspond to the lymphatic glands of the submaxillary region which have become the seat of disseminated caseation or transformed into lymphomata. In my opinion, however, this disproportionately active receptivity obtains in the normal condition of the tonsil, and to a still higher degree for the hypertrophied tonsil of youthful individuals. Thus Sacaze (17) reports a case of swollen tonsil in an otherwise healthy man of 22, which was associated with a marked enlargement of the cervical glands. While there was no evidence of tuberculosis of the latter, the presence of bacilli in the tonsils left no doubt as to the tuberculous nature of the amygdalitis: a comprehension for which the researches of Baumgarten (18) furnish strong experimental proof. Still more striking, perhaps, is the observation of Schlenker (19). Here there appeared to be an undoubted infection of the tonsils through the means of the food, and accompanied by characteristic swelling of the cervical glands.

But are we to really believe that all these simple cases of eczema of the scalp and face, all these catarrhs of the nasal passages, middle-ear and pharynx, all these enlarged tonsils, when they so often occur in healthy looking children, are of tuberculous nature?

If we answer this question in the affirmative—and a while ago it seemed as if we could not answer it otherwise—then my task of to-day, gentlemen, is easy and simple throughout. For in that case scrofula would be nothing but local tuberculosis. At first circumscribed, persisting probably for a long time within a narrow territory, the disorder would be so essentially grave that we must say “not only is the health of the child threatened, but in the future, even if at a remote period, its life as well.”

After the high tide of unicism, which naturally followed Koch's dis-

(17) *Sacaze*: Amygdalite lacunaire caséeuse de nature tuberculeuse. Arch. gén. de méd, Jan. 1894, p. 348.

(18) *Baumgarten*: vide supra.

(19) *Schlenker*: Beitrag zur Lehre von der menschlichen Tuberculose. Virchow's Archiv, Bd. CXXXIV, p. 145 and 161.

covery, the meagre number of facts increased gradually, warning us to be on our guard as to any one-sidedness in our views of scrofula. For in many a case of affection of the skin or mucous membranes, the scrofulous character of which under the prevailing views was as well authenticated as that of the glandular swelling which accompanied it, and which might straightway be put down as tuberculous, *search for the bacillus proved to be in vain*. Again the inoculation of the suspected material upon guinea-pigs, a process which has so often furnished positive results in disputed cases, likewise fails.

But what positive results may be obtained from these superficial affections, which from the clinical standpoint, as well as in part in anatomical substratum, remind us so vividly of tuberculosis, yet which are destitute of Koch's bacillus? Are the tissues within this area thoroughly sterile, or are there not perhaps other micro-organisms therein?

As a matter of fact it appears that a not inconsiderable number of these cases are none the less to be regarded as infectious, although the exciting cause is a less threatening invader than Koch's bacillus. These micro-organisms in question consist chiefly of forms of staphylococci (20), with rarely the streptococcus, and at times the pneumococcus.

If we reflect upon how widely these germs are distributed on the surrounding media, especially within closed and poorly ventilated dwellings, we shall not marvel if children who inhabit such abodes, who get such little care of the skin, who are unused to clean linen, are attacked with the slightest provocation by the pyogenic organisms just enumerated. Most dangerous in this connection are slight excoriations or similar injuries of the outer integument. Thus Wyssokowitch (21) reports the case of a long persisting eczema of the scalp and face of a five months' old child. There was a suspicion of scrofula which was strengthened by the delicate physique and phthisical history of the parents; and when there was added an enlargement of the auricular

(20) The swollen glands which result from diphtheria and scarlatina might give confusion here. For the characteristic appearance of the synchronous affection of the mucosa, although obliterated by retrograde changes which correspond to later stages, preserve sufficient evidence especially when the demonstration of diphtheria bacilli or streptococci is still possible.

But even after the healing of the primitive lesions the differences are still in evidence. For in contrast to the torpidity of tuberculous glands which have been caseous those ganglionic enlargements which follow diphtheria soon terminate in suppuration.

(21) *Wyssokowitch*: Ueber die Beziehungen der Scrophulose zur Tuberculose. Mittheilungen aus Dr. Brehmer's Heilanstalt für Lungenkrankheiten in Görbersdorf. Neue Folge, 1890, p. 37.

and cervical lymph glands this diagnosis appeared to be certain.

Nevertheless search for the tubercle bacillus, both microscopically and by animal experiment, resulted negatively. On the other hand there were found within the greenish pus which for three weeks had discharged from the swollen glands, unmistakable streptococci, which were cultivated in a considerable quantity.

In contrast to the resistance which the intact skin offers to the penetration of the tubercle bacillus, the interesting experiments by Garré (22) upon his own uninjured arm have shown that the integument is penetrable to staphylococci and streptococci. Schimmelbusch (23) and others have obtained the same result under like circumstances.

Under the influence of moderate frictions, typical furnucles and pustules were thus produced. Wasmuth (24) in fact believes that the human integument, and by no means merely in children, has a higher degree of receptivity than that of animals; a view which from the results of my colleagues and myself I can only corroborate.

That for the invasion of the mucosa—at least for many of the forms just named—no appreciable solutions of continuity are necessary, has been abundantly shown by the experiences in regard to the behavior of the gonococcus in the conjunctival sac. This membrane possesses the same permeability for the bacillus of intestinal diphtheria of the rabbit, and as Ribbert (25) has shown, this germ may also penetrate quietly into the nasal mucosa.

If solutions of continuity are present in these and continuous membranes—even if due to simple catarrh—the certainty of absorption is much greater. As soon as the micro-organisms have penetrated within the epithelia, they enter the lymph-spaces of the upper stratum, where their growth and increase are facilitated by the lymph-stasis which here obtains. The washing of the germs into the larger lymphatic vessels and the swelling of the regionary lymph-ganglia are now inevitable.

(22) *Garré*: Zur Aetiologie acuter eitriger Entzündungen. Fortschritte d. Medicin, 1885, No. 6.

(23) *Schimmelbusch*: Ueber die Ursache der Furunculose. Archiv für Ohrenheilkunde, 1889, p. 252.

(24) *Wasmuth*: Ueber die Durchgängigkeit der Haut für Microben, Centralb. f. Bacteriologie, 1892, p. 824.

(25) *Ribbert*: Ueber einen bei Kaninchen gefundenen pathogenen Spaltpilz (Bacillus der Darmdiphtherie der Kaninchen). Deutsch. med. Wochenschrift, 1887, p. 143. Compare also *Otto Roth*: Ueber das Verhalten der schleimhäute und der äusseren Haut in Bezug auf ihre Durchlässigkeit für Bakterien. Zeitschrift f. Hygiene, Bd. IV, p. 151.

In full contrast to what we have described in connection with "scrofulous" glands, the lymph-ganglia do not tend to become caseous. Much more are they inclined—depending upon the amount of virus absorbed—to either acute or insidious formation of pus, with the expulsion of the infected area or perhaps of the greater portion of the gland itself. If the amount or degree of virulence of the germs is still smaller, the lesion might persist as a simple hyperplasia. Such glands gradually losing their sensitiveness, betray their infectious nature only by the otherwise inexplicable persistence.

Probably there also belong under this head the glandular swellings seen principally in the cervical region, which by reason of their circumference and tendency to progressive growth deviate more and more from simple hyperplastic forms. For while the transition between them and the forms hitherto considered may be distinctly traced, their individuality is unmistakable. On the one hand the glands themselves are enlarged, while at the same time they assume an ever firmer, although uniformly resistant quality. On the other hand they preserve—and this point must be especially heeded—their original form and smooth outlines and surface. Through the formation and aggregation of an ever increasing number of such glands, which become thereby more and more compressed, there comes about that most striking deformity of the neck for which the much discussed term "scrofula" seems so appropriate.

As a differential sign of these tumors which, originally known as simple or hyperplastic lymphoma, become later designated as pseudo-leucaemia, may be emphasized the moist, juicy quality of the sectional surface, and its grayish-red, somewhat lardaceous appearance.

They also possess another peculiarity in regard to their consistence, holding an intermediate position between the softness of freshly inflamed glands which perhaps are inclined to suppurate, and the firmness of cheesy tuberculous ganglia (26). The greatest peculiarity, however, from the standpoint of prognosis is the tendency to involve sympathetically other groups of ganglia in the body (axilla, mediastinum, etc.), and thus produce a general disease, the greatly-dreaded "adenie."

(26) These differential characters are indeed insufficient in examination from without, to protect from every possibility of confusion with tuberculous glands. But a section through an extirpated gland should leave no doubt as to diagnosis. In my experience at least, the picture which this section offers to the naked eye is so far decisive that caseation, however minimal, speaks always for tuberculosis and against pseudo-leucaemia. The converse, however, does not always follow, as von Bruns has rightly emphasized.

Furthermore the obscurity of to-day has not yet been illuminated touching the etiological position of these tumors, regarded now as hyperplasia, now as pseudo-leucaemia. In respect to their, to my mind, undoubted relationship to infected cutaneous and mucous surfaces in childhood, we cannot forbear to place them in the category of non-tuberculous scrofula, although the intervals of space and time between the primary and secondary lesions be ever so great.

Do these two forms of infected surface and glandular disease, which we have learned to know as caused respectively by the tubercle bacillus and the pus-microbes, exhaust all the manifold affections which make up the picture of scrofula?

Here again, the answer must be: No!

For just as we so often see in other virulent processes, so here examples are not lacking of mixed infection,—better secondary infection. Through this coincidence the clinical picture loses more and more in definition. But we should not therefore underestimate these hybrid forms and exclude them from consideration (27). It seems to me that these cases ought to be especially instructive, as long as they give a clear indication as to which point of view we adopt in the entire question. No group is better adapted to bring before the eyes of an unprejudiced person the manifoldness and unclassifiable character of a not insignificant fraction of scrofulous patients. For only by the favor or want of favor of external conditions which cannot be foreseen, will it be decided whether the inflammation of the conjunctiva, tonsils, etc., caused by the staphylococcus will preserve its original character, or be impressed with a much more serious stamp by reason of a fortuitous conjunction of tubercle bacilli, proceeding from some infected co-resident, with the primary lesion of the more benign disease.

Radically important appear to me those cases of tuberculosis which are grafted upon the simpler form of disease at a late period. Notable difficulties will evidently be encountered in the bacterioscopical demonstration of such cumulation. The positive or negative result of the investigation will depend much on a fortunate choice of the proper moment. For if we bear in mind the antagonism which the individual varieties of bacilli often exhibit toward one another, it is evident that one examination, or even several will not suffice to determine the order of precedence of infection, and thereby the development of the entire disease.

(27) Compare *Ponfick*: Die Entwicklung der Entzündungs-Lehre im 19. Jahrhundert, Berl. kl. Wochenschrift, 1900, p. 279.

Nevertheless proofs have repeatedly been furnished that upon an originally purely sero-purulent inflammation tubercle bacilli have been grafted; and that vice versa, as so often happens, recent bacillary phenomena may be super-added to chronic phthisis (28).

Thus Richard Volkmann (29) saw as a result of eczema of the hand a cheesy tuberculous cubital gland. He was able to find in the secretion of the primary eczema tubercle bacilli. Similarly in a girl whom Demme (30) treated for a simple eczema of the scalp, which later took on a suspicious appearance, there developed a caseation of the submaxillary lymph-ganglia, and finally general miliary tuberculosis. Still more convincing is the following observation by the same author, because it gives us a glimpse into the etiology of these mysterious happenings. A child with eczema of the skin of the abdomen, who slept with his tuberculous mother, developed a fatal tuberculosis of the abdominal organs.

Not less instructive is a case of Teloir's (31) in relation to certain deep-rooted customs of the people. A simple chronic eczema took on, under Teloir's eyes, more and more the character of a lupus, after the tuberculous mother had applied to it a poultice of bread crusts which she herself had first chewed. As saliva has an antibacterial action it is probable that some of the mother's infected sputum had become mixed with it.

Similarly the custom in many countries of dressing recent wounds with raw milk or raw cream from tuberculous cattle may be sufficient to convey bacilli into the tissues.

If it be borne in mind that on a surface like that of chronic eczema, so long deprived of epidermis, and further the seat of rhagades, all conceivable kinds of germs would find an opportunity to lodge and develop, it will not appear surprising if a suppurating surface become tuberculous. In view of the fact, as demonstrated by Cornet (32), of the

(28) *Sata*: Ueber die Bedeutung der Mischinfection bei der Lungenschwindsucht. Ziegler's Beiträge, Bd. XXVI, 3. Suppl. Heft.

(29) *R. Volkmann*: Chirurgische Erfahrungen über Tuberculose. Langenbeck's Archiv, Bd. XXVI, p. 136.

(30) *Demme*: Bericht über die Thätigkeit des Jenner'schen Kinderhospitals in Bern für 1883 und 1885, p. 586.

(31) *Teloir*: Etiologie et pathologie du lupus. Etudes expér. et clin. sur le lupus par Verneuil, Vol. V, p. 530.

(32) *Cornet*: Die Verbreitung der Tuberkelbacillen ausserhalb des Körpers. Zeitschr. f. Hygiene, Bd. V, p. 98.

great diffusion of tubercle bacilli in the atmosphere which surrounds the consumptive, it appears astonishing that secondary infection does not occur with greater frequency; especially as these surfaces are exposed not only to the air but also to contact with unclean fingers and apparatus.

It is by no means necessary that the original affection shall first lose its indifferent features in order to take on after a short respite the tuberculous character. It is true that the permeability of the affected area has probably increased, and that its epithelia have either become lost or loosened. But secondary infection must still depend on numerous elements of chance. For example the germs may remain fast within the radicles of the lymphatic system and exert their pathogenic action directly upon the skin. In the majority of cases, however, the germs will be carried to the nearest lymph-ganglia, there to give rise to their specific lesions.

It will happen often enough that the substratum is so lightly infected by the bacilli that no naked eye changes can be made out; here the microscope may reveal well marked tuberculosis.

At times the surface which has been inoculated appears to form a sort of connecting link between the external world and the interior of the body. In the first place, all kinds of germ-life from without adheres to it; while as far as the interior of the body is concerned this cutaneous surface acts as a protecting filter which at the same time is not free from an element of danger. Hence the development of tuberculosis is not always a grafting of this disease on a harmless surface, but is not rarely a smuggling of malignant germs deep within the body without the parasite's having left any visible traces of its presence in the skin.

In an assembly of clinicians like the present, it is pertinent, gentlemen, to expressly emphasize this distinction. For only by this means can we comprehend what at first sight appears to be a paradox, that the new invasion of an affection of the surface will at times hardly influence the latter, which may preserve its unsuspecting appearance for a considerable period.

If the conditions offered by the anatomical conditions of the skin—whether this be injured, inflamed or ulcerated—be unfavorable for the reception and diffusion of the bacillus, those furnished by the mucosa behave in an essentially different fashion. The lining membrane of the mouth, nose and pharynx has a thinner and softer epithelial layer, has a much denser vascular network, and is traversed, even in its superficial layers, by a plethora of large lymph-channels. To the sum of these

quantities do we owe the fact that not only do bacillary germs more readily adhere, if defects are present in the membrane; but that provided they thrive in the interior of the mucosa the reaction which they produce upon its cells will give rise to an eruption of tubercles.

Therefore, it more readily happens in the mucosa than in the skin that insignificant inflammations go over into tuberculosis. On the other hand, the inconstancy of the occurrence of such complications—for example in adenoids—is to my mind responsible for the dissimilarity of the results obtained by different investigators.

According to my experience we have here a facultative tuberculosis. At first adenoids appear in connection with simple staphylococcus or pneumococcus pharyngitis—and often persist unchanged. If tubercle bacilli lodge in this nidus so admirably adapted for the propagation of germs, typical miliary nodules develop. These bacilli may arrive at the adenoid tissue from without or, more commonly as I believe, from primary foci within the lungs. But whatever the actual source of the bacilli we should regard the disease provisionally as a purely local tuberculosis, which must be prevented from infecting the organism at large.

This coincidence of adenoid vegetations with local eruption of tubercle finds analogy in the behavior of many cases of suspected "lymphoma." Thus Koch (33) succeeded in finding in the interior of the cervical and axillary glands of a youthful patient typical miliary tubercles with giant cells and bacilli, although to the naked eye nothing could be made out but hyperplasia and a diagnosis of pseudo-leucaemia had originally been made.

Such an apparent contradiction could be explained only by the view that the tuberculous virus had been conveyed to a substratum which was the seat of chronic proliferation. Tumors of this sort which you may all have seen in connection with supposed pseudo-leucaemia, constitute a connecting link as a hybrid form, because they stand between the simple, hyperplastic form, engendered by the pyogenic microbes, on the one hand, and the originally tuberculous form on the other, which at least in the cheesy forms betrays its nature at a period early in the disease.

Similarly manifold are the infectious diseases to which the mucosa of the middle-ear (34) is exposed. As I could show you in a series of 100

(33) *Koch*: Die Aetiologie der Tuberculose, 1884.

(34) *Ponfick*: Ueber die allgemein-pathologischen Beziehungen der Mittelohr-Erkrankungen im frühen Kindesalter Berl. kl. Wochenschrift, 1897. p. 817.

nurslings carefully compared with one another, we find at this age much more frequently than in after years an affection of the middle-ear which is often the result, and more rarely the cause of other affections. In regard to the method of propagation of the virus this disease excites our liveliest interest. At the first glance the tympanic cavity appears difficult of access for germs, especially when we consider the narrowness of the Eustachian tube at that tender age.

By reason of my experience which in regard to its amplitude may transcend that of other observers, I regard this form of otitis media as not invariably secondary to an inflammation of the air-passages. On the contrary, I believe it is often an independent affection.

In a considerable number of little patients, this affection of the middle-ear becomes retrograde in the course of a few weeks and heals without any reservation, although in not a few cases there is a fatal tendency to relapse. In a certain proportion of these cases, however, the disease persists with complications, at times also with remissions, to terminate gradually in an otorrhoea.

This widely diffused soil possesses for the train of thought which we are following to-day, a peculiar interest, in that it has from time immemorial been looked upon as one of the leading evidences of scrofula. It will serve me, in regard to the differences in its nature and origin, as an unequalled example to illustrate the great dissimilarity between the etiological and the pathological conceptions of scrofula.

If we look for the individual phenomenon of this disease from the standpoint of modern bacteriology, we are convinced at the outset that precisely in otorrhoea—until recently regarded as one of the most characteristic indications of scrofula—the bacillus tuberculosis comes in play only in isolated cases.

There are indeed cases of subacute or of latent, insidious affections of the middle ear, in which the purulent and caseous contents of the tympanum exhibit the presence of the germ in question, and where, moreover, typical miliary nodules are found in the mucosa. Here we cannot doubt the existence of a true tuberculosis of the tympanum.

But incomparably more frequent are the otitides which set in suddenly with a sharp reaction and at times a high fever. In these cases, however, according to the thorough testing which Nadoleczny carried out in connection with the sero-purulent discharge obtained by paracentesis of the drum-head, the germs found were those which excite simple inflammation or suppuration. In 33 cases thus examined (children and adults), nearly one-half showed the presence of pneumococci, not infre-

quently accompanied by some form of staphylococcus. In a third of the cases, streptococci were found, often associated with staphylococci. Finally the latter occurred alone in one-sixth of all cases.

If we especially consider the cases of ten children (below eight years of age) in the above series, the relative occurrence of the various forms of germs offers nothing peculiar.

The results of Nadoleczny (35) are essentially confirmed by those obtained by Preysing under my direction at the Breslau Pathological Institute, with a larger material. Here in a preponderating majority of the cases various forms of cocci were discovered and especially the pneumococcus.

Almost exactly the same results have since been obtained by Siegfried Weiss (36), mostly in cases examined a few hours after death. He also found the diplococcus pneumoniae the predominating micro-organism. Especial prominence should be given to the fact that Weiss was able to follow the various germs for some distance into the superficial layers of the mucosa.

These experiences which distinctly advance our knowledge as to the exciters of infection in acute and subacute otitis media, are in best accord with the results previously obtained by others. There is full unanimity that in all the cases studied by the three authors quoted above, tubercle bacilli could not be found.

Therefore in the scrofulous catarrh of the middle-ear—just as in the skin and adjacent mucosae—we have on the one hand, a sero-purulent discharge which results from the penetration of the pneumococcus and less frequently of the streptococcus (in combination with the staphylococcus); while on the other hand we have far more rarely cheesy tuberculous inflammation, called forth by the specific bacillus. The incontestable preponderance of the simple inflammatory form of otitis media can only strengthen anew the favorable prognostic judgment in regard to ordinary “purulent catarrh” of the tympanum, and acute otorrhoea; a stand-point which I have already formerly held, but which was only tardily adopted by many others.

Between these two forms so sharply differentiated bacteriologically, and to some extent histologically, especially in the later stages, is inter-

(35) *Nadoleczny*: Bacteriologische und klinische Untersuchungen über die genuine, acute, exsudative Mittelohr-Entzündung. Archiv für Ohrenheilkunde, Bd. XLVIII, p. 209.

(36) *Weiss*: Zur Aetiologie und Pathologie der Otitis Media im Säuglingsalter. Zeigler's Beiträge, Bd. XXVII, p. 113.

posed a hybrid form. If the mucosa damaged by the pneumococci or staphylococci is further exposed to the contact of tubercle bacilli, the hitherto catarrhal process is transformed little by little into one of tuberculous character.

In precisely these cases, which are naturally as obstinate as the primarily tuberculous otitis, there are opened to us, as I believe, new and valuable glimpses into that form of chronic otorrhoea which is of the greatest interest from the standpoint of scrofula. Bacteriological researches have not been sufficient in these cases to enable us to follow the entire process in regard to the sequence of infection. But although suspicion of tubercle has been so belated that the bacillus has been found only in advanced stages, whether in the tympanic discharge or in the swollen auricular glands, we may still infer that the soil upon which this bacillus developed had originally been invaded and prepared by pyogenic germs. In any case it would be premature to regard the presence of tubercle bacilli in an otorrhoeal discharge as evidence of primary tuberculosis, and to interpret it with correspondingly bad prognosis, because in the great majority of cases negative results are obtained in connection with search for this micro-organism.

Here belong those cases, apparently by no means rare, in which consumptives with dental caries develop a tuberculosis not only of the alveolar process and contiguous gum, but of the buccal mucosa as well. Thus Doutrelepont (37) reported the case of a man who had coughed for two years, in whom the wound made by extracting an upper molar tooth showed an extraordinarily slight disposition to heal.

Instead it took on a tuberculous character, and after the expulsion of several splinters of bone extended to the entire alveolar process, upper jaw and mucosa of the cheek. Schliferowitsch (38) has described a similar case and Neumayer (39) a third in which the process extended to the nose.

If now we survey this problem as a whole, we come to the conclusion at once, that the word "scrofula," already a collective term from the clinical standpoint, comprises a whole series of processes which are in the entire sense of the word dissimilar: for not only are they called into

(37) *Doutrelepont*: Ueber Haut-und Schleimhaut-Tuberculose. Deutsch. med. Wochenschrift, 1892, p. 1033.

(38) *Schliferowitsch*: Ueber Tuberculose der Mundhöhle. Deutsch. Zeitsch. f. Chirurgie, Bd. XXVI, p. 257.

(39) *Neumayer*: Ein Fall von Mund-, Kiefer-, und Nasen Tuberculose. Archiv f. Laryngologie, Bd. II, Heft 2, Centralbl. f. Laryngol. Bd. II, p. 771.

being by different bacterial influences, but they further present the same want of similarity from the histological point of view.

The superficial view, therefore, that scrofula is only a localized tuberculosis does not represent the whole truth. If scrofula be a localized tuberculosis, i. e. a form of the latter which only attacks the outer and inner lines of defence, the surface of the body and the lymph-ganglia, then we should have to exclude from this conception of the disease not only such forms as are due to purely pyogenic micro-organisms, but also the mixed forms as well. A similarly one-sided conception of scrofula is that which terms it a tuberculosis of childhood.

Under such circumstances would it not be more natural, I hear many of you ask, to straightway abolish this term from medical nomenclature, to make way for one more rational? Why do we always strive to retain this term which has been quietly buried by so many text-books, when we really believe that the conception of scrofula has been outlived? As a result of the progress of science, it has been replaced by a series of infectious inflammations, which certainly do present certain common peculiarities (40) in their evolution, but which nevertheless differ radically in causation, as well as in pathological anatomy.

If in order to quickly outline these infectious inflammations we separate them into three groups, our hitherto so-called scrofula is seen to consist of: 1st. Inflammations (41) caused by pyogenic micro-organisms. 2nd. Others which owe their origin to the tubercle bacillus. 3rd. Others which depend upon the presence of both forms of micro-organisms, or in other words mixed, or more frequently secondary infections.

This last group is naturally divided into two sections. In the one, should be placed cases in which pyogenic organisms open the scene and tubercle bacilli follow. To the other section belong those cases in which the tuberculous infection is primary, the pyogenic admixture being secondary.

This latter type includes certain cases of lupus of the skin and mucosae, and a very large amount of chronic-ulcerating tuberculosis of the lungs, digestive and urogenital apparatus. But also in closed organs we see something of the kind occur, especially in lymph-glands

(40) These characteristics are according to Virchow (*Geschwülste*, Bd. II, p. 586-598) the appearance of similar foci of disease in various regions of the body, the insidious course and tendency to relapse.

(41) Under this short expression are included necessarily the proliferative and hyperplastic processes therewith associated.

which have long ago undergone caseation. If under the influences of an acute inflammation in the region drained by the regionary ganglia pyogenic cocci succeed in penetrating to the already tuberculous glands, the rigid and immovable masses of the latter suddenly become fused together and softened.

In short, from the etiological point of view, there is a pyogenic scrofulosis, a bacilloigenous and a variety in which both these forms are conjoined.

But are all the pathological features of these conditions exhausted by the local invasion by the different bacteria on the one hand, and the reaction of the organism to this invasion on the other?

I believe this is hardly true.

Are there not, perhaps, a series of general phenomena which lend to the local process,—occurring as it does in so many kinds of patients, young and old, strong and weak, prosperous and indigent, and especially in children, and children of particular types,—a peculiar *cachet*?

I answer, "Yes."

It is from such general characters that experienced pediatricists not only continue to use the term scrofula but also actually believe in the essential existence of such a condition.

As is known to all, that which we know broadly as the "constitution" possesses for every human being two phases, general and individual. In my opinion it would be more fitting to speak of two chief sources. The general substratum deals with the qualities which belong to a particular period of life; while the personal substratum is the sum of those qualities which are essential to the personality of the individual, differing from the general qualities not only in nature, but also in causation.

In contrast to the usual mode of presenting these two substrata, in which, to my mind, the personal are exploited at the expense of the general qualities, I desire to give the greatest scope to the latter. Let us bear in mind that we have to do with disturbances which occur almost wholly in childhood, and we can then understand that the general features must play a role of an importance much greater than is generally admitted.

The nature of this universal substratum rests upon certain peculiarities in the structure of and relations between organs which in childhood are universally conceded to possess a high degree of morbidity. These peculiarities are due to the fact that the tissues of these organs have a marked receptivity not only for bacterial intruders but also for certain excretion products; and, besides, to the fact that the local develop-

ment of the said organs favors not only morbid processes, but the diffusion and transmission of the same.

In regard to the greater receptivity, which must be functionally denoted by diminished resistance of the substratum, this depends on the number of individual cells and the amount of protoplasm therein (and in the first place of those cells which compose the outermost layers of the epithelial covering of the integument); and not less upon the unequal richness in plasma of the parenchyma and the softer make-up of the intercellular substance, which is a natural result of the immature condition of youthful tissues. In certain regions in which purulent inflammations occur in children with special violence—such, for example, as the mucosa of the tympanum—this predisposition may often be shown in the most conspicuous fashion. Every observer is here impressed with the astonishing violence, the stormy character, with which an otitis media may supervene in a child.

While the saturation of the intercellular substance with lymph is made possible by the great distensability and abundance of the plasma channels, the capacity of the coarser lymphatic vessels, while considerable *en masse*, is narrow in the individual vessel; so that a want of proportion exists between the volume of the peripheral lymph-spaces on the one hand, and the narrow calibre of the coarse vessels on the other. As soon, therefore, as any local affection increases and accelerates the stream of lymph—and this is the inevitable tendency in every acute inflammation with suppurative tendencies—it must necessarily result that lymph-stasis develops. As long as the exciting causes are trivial, no severe or persistent disturbance results, provided the lymphatic vessels are able to dispose of the threatening accumulation of fluid lymph. But once let formed particles, flocculi of fibrin, clumps of bacteria, and above all coherent masses of pus corpuscles, clog the lymphatics, and the latter quickly refuse to discharge their functions. While even after repeated attacks in which lymph stasis is threatened, it is exceptional for the vessels to become obstructed permanently, yet transitory blocking may here and there occur. I believe that through this mechanism may be explained many swellings and tumefactions of a persistent character, such as one often sees in “scrofulous” children—that is in any children of tender years with any form of local infection involving disturbance in the movement of the lymph. I will refer only to the thickenings, so frequently seen in the skin and mucosae; of which those of the conjunctiva, nose, lips, etc., so poor in or even destitute of lymph follicles, have heretofore been explained by hyperplasia of such follicles.

But the distinctly diffuse quality of these thickenings, should have shown that such a circumscribed factor as the enlargement, whether of follicles or secreting glands, would in no wise suffice to account for the condition under consideration. All signs point rather to a diffuse anomaly, such as would result from circulatory disturbances.

There are still other factors to be considered in order to come to a perfect understanding as to the vulnerability (42) of the scrofulous organism. I ask for example, as to how the leucocytes of the immature organism behave in the presence of the toxins secreted by bacilli which have penetrated into the parenchyma of the glands, etc.? Have we any right to assume that the attraction of the leucocytes is the same in children as in adults? And if there are differences here,—and I think this at least probable,—why should they not depend on the liveliness of the affinity which subsists in childhood between the toxins and white blood-corpuscles?

Again what are the limits of the proliferative activities of the cells, and of the karyomitotic energy of the tissues in the various phases of childhood? There is more than theoretical reasoning to support the claim that considerable dissimilarity exists in this direction. No attentive investigator could escape noticing how extraordinarily changeable is the ability to proliferate on the part of the individual tissue-elements under the influence of the same bacterial species and under conditions which are otherwise the same. Why do we always seek to account for these dissimilarities solely through the behavior of a single factor in the case, the bacillus, either in respect to the number of the latter or the degree of virulence? May not the other of the two factors, viz., the cell constituents of the substratum, also play here a role of proportionate importance?

Finally, who could leave out of consideration the unequally great activity of the manner of reaction which distinguishes the walls of the blood vessels, especially of the capillaries in childhood? A factor which must exert so great an influence upon the amount and composition of the products of exudation? Who would underestimate the unlike facility of the nervous excitability—by no means confined to the brain and cord—which resides in the peripheral ganglionic apparatus?

These causal elements just cited are indeed, it is highly probable, only a few among many. Here you will perhaps oppose me with the remark that even I must be disposed to admit that this is not explained in a sufficiently thorough manner. No one is better aware than I that fu-

ture researches have much to accomplish in this particular direction. But if a glimpse of progress ever is to be sighted in this long barren territory, we must take pains to-day so seize on possibilities with a keener eye, so that by methodically following them up we may more and more illuminate the obscurity in which the substratum is enveloped.

But aside from these general peculiarities incidental to the time of life of the scrofulous child, is there not on the other hand the individual disposition of such patients to be reckoned with?

Quite so! In certain individuals, often the offspring of particular families, we see an intensification of that disposition to scrofulous affections which belongs to all children, and especially to the youngest.

It is true that we have not yet succeeded in demonstrating a histological basis for this dissimilarity. But this objection will not much affect those who remember how rarely it is possible to recognize any dissimilarity in the tissues of one individual as compared to those of another (43).

If we turn to the purely individual substratum, we will find here as well that one-sided importance has been given to the bacteriological factor, especially in regard to the individual disposition to tuberculosis and scrofula.

“Is tuberculosis communicated by heredity?”

“Is tuberculosis itself inherited or only its substratum?”

These and similar alternatives monopolize our discussions at the present time.

In accord with the points of view which obtained in the treatment of the subject of general predisposition, I am far from attempting to look upon scrofula as an equivalent to tuberculosis, or even as the principal element of the latter. For all those who wish to preserve the conception of scrofula will at least agree that we can no more dispense with a congenital individual disposition in connection with infection by the staphylo-, pneumo- and strepto-coccus than in the case of the tubercle bacillus itself.

In fact we are dealing here with well authenticated experiences which make extremely probable the factor already alluded to, of increased attraction of the leucocytes; the well known fact that many children, even when of the same family, react in a very dissimilar

(43) *Rabl*: Ueber den Bau und die Entwicklung der Linse. Zeitschr. f. wissensch. Zoologie, Bd LXIII, p. 65-67. Rabl and others have recently demonstrated the surprising manifoldness of the structure of certain organs in different species of animals—a study which has been greatly neglected.

fashion to small injuries or to the same infectious etiological elements. Even popular speech gives expression to this striking phenomenon; since to such individuals whose constitutions are so susceptible to wounds a particular designation is given (in German *Süchtige*). What should this name signify unless the disposition, in the presence of weak bacterial irritation, to a disproportionate emigration of white corpuscles, expressed to the senses by profuse secretion of pus.

In regard to the substratum of tuberculosis, I must refrain from the introduction of the controversy as to whether the bacillus itself is transmitted by heredity, or whether the inheritance is only a morbid susceptibility to the attack of the bacillus.

This susceptibility could hardly be anything but certain defects both in the morphological as well as the chemical composition of the body of the child, either present at birth or appearing in the course of development. This individual disposition may not only be an heirloom, but may likewise be acquired as a result of all the injurious influences to which the child is subjected in the first years of life. For it is clear that persistence of unfavorable surroundings, disturbed nutrition, diseases of childhood withstood and the like, not only interfere with metabolism and growth, but result gradually in severe damage to individual organs, if not to the entire body.

In my opinion it cannot be doubted that the first mode of propagation possible—the intrauterine transmission of tuberculosis—actually occurs. It must, however, be added that such transmission occurs but rarely.

If we recognize that the vast majority of cases of tuberculosis, even in nurslings, are acquired after birth, we must not doubt that the inheritance of the substratum is a powerful factor in the production of these cases. For only when we bear this influence in mind can we comprehend the great similarity in the nature and violence of the infection in different children.

Without dispute it must be admitted that the inherited individual as well as the general disposition, must have its roots in something other than the proper substratum of the patient. It should only be sought in the vital qualities of the blood and lymph, derived from the special chemical composition, and in the sum of the vital forces, as contained in the cells of the tissues.

At the first glimpse it would almost seem as if the individual substratum might be regarded as an increase in the tendency common in childhood to a more active exudative and proliferative reaction. But if

we give the matter a more accurate survey, we readily become convinced that these essentially quantitative differences do not suffice to satisfactorily explain the dissimilarity.

Let us only remember the well known peculiarities, as betrayed by the characteristic anomalies of growth of the children concerned, and in other hardly less deep seated disturbances of the entire course of development.

From the present standpoint of embryology we cannot but regard these deviations from the normal constitution, which the patient brings with him into the world, as a weakness of certain territories of the formative cells. No one therefore will be deceived in believing that the investigation of the future will find a fertile field in this difficult province.

At the close of this my sketch, I need no longer fear to be misunderstood by you, gentlemen, when I state that it seems to me quite an open question whether the present conception of scrofula will go over into the next century unchanged or be replaced by the new one. As a disease in itself, it has doubtless been relegated to the past. The critical analysis undertaken in this direction has shown us that the old conception comprises a whole series of etiologically and in part also pathologically different processes.

There only remains the significance of the constitutional anomaly which influences in a variable sense the course of similar infections.

This constitutional substratum rests in part upon an inherited or acquired increase of certain defects in the organism of the child, and the greater excitability towards the excitors of infection with which we are surrounded; and in part upon congenitally abnormal arrangement of definite cell-complexes; also in very rare instances in the direct transmission of the pathological agent.

Let us hope then that practical medicine will decide as to whether to retain the name of "scrofula" out of respect to custom, or replace it, in respect to the universal nature of the underlying constitution, by some other term. In any case it will be allowable to bring into general use a more cleanly cut anatomico-physiological conception of scrofula than that which we have had in the past.

Whatever resolution you may adopt in this connection, I trust that in this fleeting hour I have pointed out the way to gain a satisfactory glimpse into the nature of that yet insufficiently definable factor, the individual substratum.

SOCIETY PROCEEDINGS.

AMERICAN INVALID AID SOCIETY.

On March 5th the society held its annual banquet at the Hotel Lenox, Boston. Drs. V. Y. Bowditch, E. O. Otis, H. C. Clapp and F. I. Knight were present as special guests of the occasion and were invited to speak on the subject, "stamping out consumption."

Mr. L. C. Southard, the president, in an address recalled how more than a dozen years ago the society had been organized under the leadership of Dr. E. E. Hale. He explained that the work had been both educational and practical—educating the people concerning the best methods of preventing the spread of consumption, and assisting physicians in sending incipient cases to climates more favorable to a recovery. He said: "It is our purpose to assist the afflicted, regardless of race or religion, provided they are of good character and the disease is not too far advanced."

Then followed papers and discussions, some of which are given either in full or in abstract.

ADDRESS OF DR. V. Y. BOWDITCH, BOSTON.

Members of the American Invalid Aid Society, Ladies and Gentlemen:—

It is with great pleasure that I say a few words to you to-night. I appreciate the honor of your invitation and esteem it a privilege to take part in a meeting of a society, the chief aim of which is to diminish the ravages of consumption. Whatever difference of opinion may exist among individuals as to methods, when the object to be attained is the same, we can all wish each other Godspeed and help each other by interchange of thought, and by so doing work with clearer vision and wiser judgment.

As some of you may know, my chief study in the past ten or twelve years has been the sanitarium treatment of consumption. Having observed the methods of Brehmer, the father of the idea of sanitarium treatment of phthisis, in Görbersdorf, later of his pupils, Dettweiler in Falkenstein; of Trudeau at Saranac; with a personal experience of ten years at the small sanitarium at Sharon and in the last two and a half years at the large State Sanatorium at Rutland, Massachusetts, I have become more and more firmly convinced that strict medical supervision at a critical period of the disease is productive of far better and surer results than any other method that I know.

In saying this I do not wish to be misunderstood. In advocating strongly the establishment of sanatoria in our own state for the cure of incipient cases among those who for various reasons are unable to seek distant resorts, I have, up to the present, never changed my opinion that were such sanatoria established also in more sunny, less changeable climates than our own, even more favorable results could be obtained than heretofore for certain classes of cases. While saying this, on the other hand, I have reasons to believe from my own observation that certain individual cases, when under proper supervision, do even better here than in many of the renowned health resorts. The reason for which I can only explain by the somewhat vague generalization that the idiosyncrasy of the patient has to be considered in every case.

I am convinced beyond the shadow of a doubt that the results obtained at Sharon and Rutland would have been impossible by any methods that I have hitherto employed at the patients' homes, or by ordinary office treatment. The fact that patients are told what to do and what not to do in the matter of exercise, diet and other hygienic measures at a time when error through ignorance may be fatal, is a most weighty argument in favor of sanitarium treatment and the discipline it involves. The old arguments, now happily falling into disuse, against the depressing effects of institution life, and similar objections, have in my experience proved in the great majority of cases mere shadows of the imagination and amount to nothing when compared to the advantages to be obtained by close supervision. The philosophical attitude, even the gaiety of the majority of the patients in every institution of this nature is something I have always been struck with, and such without exception, has been the experience of others who work in similar lines to my own.

I have watched the efforts of your society to give aid to the many worthy people who have been stricken with disease, with deep interest and I have come here to-night hoping to hear more of the work you are accomplishing. * * * * * *

I am most desirous that this society should live and grow steadily, for I believe it has a grand future before it in its power to relieve thousands of sufferers, but I should greatly deplore any action which should hinder its growth in what I believe to be the right direction. Let it work patiently and cautiously to enable those who wish to do so to live in distant and more healthful climates, but I hope to see it work hand in hand with those who believe that even greater good can be accomplished by the establishment of properly regulated sanatoria wherever colonies of consumptives may be gathered together.

I have spoken thus far only of sanatoria for the treatment of incipient cases with the hope of arresting the progress of disease and enabling patients to become useful members of society again. Such institutions should be established by the state and should be located away from the cities in properly selected regions where good drainage and pure air can be obtained. Equally for the common good are special municipal hospitals for the hopelessly sick in the immediate vicinity of our large cities and towns. No one who has not been brought in contact with the great number of poor consumptives who are a constant burden and source of danger to the community in which they live, can possibly realize the great need that we have for such hospitals. It is a source of greatest satisfaction to those of us who constantly feel the great lack of such accommodations for the consumptive poor, that an active agitation of the subject among our own city authorities has recently taken place in consequence of a movement made by well-known citizens. It is one of the most hopeful signs of the future and whatever the decision as to the exact building or locality to be used, the subject should receive the cordial support of every citizen.

In advocating any measure or series of measures, to meet this great public need, we must remember, however, that we have not yet obtained the panacea for wholly eradicating consumption from our midst, but a great step has been taken of late years in the right direction for at least lessening its ravages. As has been often said, but it cannot be repeated too frequently, all such institutions when properly conducted, whether for incipient or advanced disease, are educational factors of incalculable benefit to the community, not only as a means of cure, but as a means of prevention of disease. They teach that good ventilation and good food are essential for health, that bad air in our homes, dirty streets and poor food are productive of disease.

Let us all work together, then, in cordial good fellowship in supporting every measure worthy of respect, for combatting the "great white plague."

That your society may steadily grow and flourish as it deserves, is my sincere desire.

MEASURES FOR STAMPING OUT CONSUMPTION.

BY DR. E. O. OTIS, BOSTON.

To stamp out consumption is not an iridescent dream, but a sober possibility, even a probability, and it will be the object of this brief

paper to indicate some of the measures by which we can proceed towards this profoundly desired end.

It is all expressed in one word,—prevention; but how? First by controlling the sources of infection. This, however, presupposes a knowledge of the sources, and here comes our difficulty. Compulsory notification of all cases coming under the observation of the physician, as is now the case in Boston, is one means to the end, and therein is abundant justification of such a measure. Again, to report a disease presupposes ability to recognize it; hence a careful inquiry in all suspected cases, and skill in detecting the disease in its early stages is essential on the part of the physician. But here we are met by the obstacle that a large number of cases do not come under direct medical observation or treatment.

What can we do to get hold of these? We can do something by instructing the public that any deterioration in health and vigor may mean consumption; that certain symptoms like a chronic cough, gradual weakness, loss of appetite, etc., are suspicious symptoms and require the advice of a physician. Further, by teaching them that consumption is most curable in its early stage and therefore it is of vital importance that it be recognized in its inception, when treatment can do so much.

School inspection as it is now practiced in this and other cities aids by bringing under the daily observation of a skilled physician a large number of children. So the ease, and freedom from expense, with which the poor can now obtain skillful medical advice in our numerous dispensaries and hospital out-patient departments. At the Boston Dispensary, for example, there exists a special department for tuberculosis of the lungs.

House to house visitation among the poor, in the tenement house districts of the city, as is proposed by the Boston District Nursing Association. The daily visitation by the dispensary physicians, at their homes, of all the sick poor. Teaching the people themselves to recognize possible infection from those about them, in workshop and at home, who cough or expectorate. The above are some of the ways in which we can increase the number of the cases that we can gain knowledge of.

Granting, then, that we can gain knowledge of the sources of the disease by these means, what shall we do to prevent its spread? Place those curable in the way of being cured where at the same time they will be out of the way of infecting others. Teach the families of those incurably ill to properly take care of the sputum and other excreta;

failing in this remove them to a special consumptive hospital. Disinfect all rooms and abodes where a consumptive has lived or died.

See that such a law as exists in Minneapolis is enacted and enforced, —that no milk shall enter the city except from cows proved to be free from tuberculosis by the tuberculin test. Further, have a careful inspection of meat and animals slaughtered for food.

When all this is done; when we have obtained all the knowledge we can of the sources of tuberculous infection; when we are doing all we can to control the consumptive and his dejecta; when we have instructed, as best we can, the public how to avoid contracting the disease; only one side of the problem has been dealt with.

The other side is the improvement of the hygienic condition of the poor, both personal and that of their habitation, and the conditions under which they pursue their avocation. A perfectly well person even if exposed to tuberculous germs will suffer no harm from them, for the soil is not favorable for their growth.

Conversely, a susceptible person, one from a consumptive family, although, unless exposed to infection, he will never have the disease, yet when exposed he will readily do so. "If I should be asked," says a well known authority upon tuberculosis, Dr. Knopf of New York, "what conditions are most conducive to the propagation of tuberculosis and especially pulmonary tuberculosis, I would have to reply, 'the conditions that prevail in the old-fashioned tenement houses as they still exist by the thousand in this and other large cities.'"

Tenement house reform, then, is a direct and vital step towards stamping out consumption. Proper housing of the poor, where light, air, and cleanliness are possible, is perhaps the greatest factor in solving the tuberculosis problem. The parks, playgrounds, public baths, proper and efficient ventilation in school rooms and workshops are all valuable and efficient aids in the struggle.

Proper, wholesome food, properly cooked, is another essential, and still another is the regulation of hours of labor so that the workingman or woman may have sufficient time to become thoroughly rested after each day's labors; nothing is more conducive to disease of any kind than overexertion or overwork.

Anything and everything that will conduce to the better physical condition of the poor will by just so much directly diminish the prevalence of consumption, by rendering the individual unsusceptible to the contagion. Here, then, are work and opportunity enough for all who desire to take part in this warfare against consumption.

Another potent indirect cause of tuberculosis is alcohol. Anyone who has had much to do with consumption among the poor notices the proportionately large number of cases among teamsters. This at first seems strange when we know how constantly they are out of doors. The reason, I believe, is that this class of workingmen are so frequently drinkers. By this habit they put themselves in the most favorable condition to be injuriously affected by variations of temperature, and also they neglect proper eating; alcohol takes the place of food, and thus the resisting power is diminished. The converse is also true; not obtaining good food regularly they try to make up the deficiency by drinking. Here, then, is another line of attack;—fight the rum-shops, and put your workingman in such a normal condition of health that he will not desire to drink; do this by proper housing, where he can have a pleasant, comfortable home, and by allowing him some hours to spend in it; by instructing his wife how to prepare nutritious and attractive meals.

We see then how these causes and their remedies dovetail into each other.

Let us return to the direct cause of the disease,—the contagion from a consumptive to a non-consumptive, conveyed through the dried sputum containing tubercle bacilli. "The intensity of the contagion," says Flick, "is in proportion to the intimacy of the contact: (1) In the immediate environment of the tuberculous subject,—his room, his clothing, his bedding, furniture, etc.; (2) The things which he handles,—utensils, implements, articles of merchandise, etc.; (3) Places and objects which he comes in casual contact with."

"Family relationship probably gives rise to 50 per cent. of infections;" the same author says, house contamination to 25 per cent; contamination of clothing, utensils, implements and food to 15 per cent; and casual contact and all other forms of contamination to 10 per cent. Spitting out of doors by a tuberculous individual or even in street cars or halls, probably is a very small factor in conveying the disease—air and sunlight soon kill the bacilli.

Baldwin mentions an instance where two of the employes in one of the largest metropolitan hotels were known by him to be afflicted with tuberculosis, and both were assistants in the cook's department. One coughed and worked a year and a half before he was made aware of the disease. He gives another instance where of twenty-two pupils graduated from a high school a few years ago, twelve had already died of tuberculosis, and only one was known to have it while yet in school.

Somehow or other we *must* control these sources, as I said in the be-

ginning, which is a sufficient reason for compulsory notification. Those tuberculous persons who go about and are able to work must be prevented from communicating the disease to others by proper instruction as to the care of the sputum, or infinitely better by enabling them to go somewhere and be cured. Here comes in the value of the work of this society in sending such persons to a favorable climate; also the value of state sanatoria, like the one at Rutland, in this state. Many other states, recognizing the prophylactic as well as the curative value of this movement, have taken steps to follow the example of Massachusetts; such are New York, Pennsylvania, Rhode Island, Maine, Connecticut, Illinois, Minnesota, Michigan and New Jersey.

That other class of incurable consumptives, when unable or too ignorant to properly dispose of their sputum, must be removed to a special consumptive hospital, and it is gratifying to know that this city is likely in the near future to provide such an institution; thus the public will not only be protected, but the poor and helpless consumptive be decently cared for while he lives, which is not the case at present. Now, the poor house is his only refuge.

Disinfection of premises after a death by consumption, or where a consumptive has occupied a room or tenement should be in every case enjoined. So also in the case of sleeping cars and steamboats. Recently a case of mine was sent back from Aiken in a dying condition and too helpless to care for his sputum. Surely the sleeping car berth which he occupied should have been thoroughly disinfected before occupancy again. Hence arises the question of periodic disinfection of all sleeping cars, steamer cabins and hotel rooms. This is of the highest importance in health resorts where many consumptives congregate.

In Cannes, France, for instance, disinfection is very strictly enforced and evidence that it has been done must be submitted before the room or villa is recommended for occupation again.

The struggle against consumption is a many-sided one as we have seen. The warfare will be long and arduous, calling for sustained and strenuous exertion, but if not wholly stamped out, I believe that with our present knowledge of its bacterial origin, and the method of its extension, that we can so limit its ravages by the measures above outlined, that it can be restricted to the narrowest limits, as smallpox now is, or even as leprosy, which in the middle ages existed in almost every country and in the islands of the sea, and for the care and isolation of which 19,000 leper hospitals were computed to have existed throughout Christendom.

The incalculable boon conferred upon humanity by freeing it from

this terrible and devastating scourge, is an incentive to arouse the utmost efforts of those of us who keenly realize its present ravages.

CAN TUBERCULOSIS BE EXTERMINATED.

BY HERBERT C. CLAPP, M. D., BOSTON. VISITING PHYSICIAN
TO THE MASSACHUSETTS STATE SANATORIUM FOR CONSUMPTIVES AT RUTLAND.

In the crusade which has been started in many parts of the world in recent years against this dread disease, a crusade which, to a great extent, owed its origin to the remarkable successes achieved in the German sanatoria, the first of which were conducted by the celebrated Brehmer of Görbersdorf and Dettweiler of Falkenstein, one argument has often been advanced that by the adoption of the modern methods of combatting it, this terribly destructive pestilence may within a comparatively few years be completely exterminated.

Now, while I trust I am as enthusiastic as any one for the general adoption of these methods of treatment, and am proud of the distinction which our Commonwealth of Massachusetts has gained in being the first state in the world to establish a sanatorium for consumptives at the public expense, and hope to see the time come soon when every state in our union will go and do likewise, and feel sure that the good results to follow will far more than warrant the necessary expenditure, yet I cannot be optimistic enough to believe that the disease is ever to be entirely stamped out (if so, not for many generations), and think that nothing is to be gained for this or for any other cause by an overstatement of the argument. My reasons are these:

It is now pretty generally acknowledged throughout the world that the *special* cause of phthisis is the bacillus tuberculosis, the rod-shaped parasite discovered by Koch, which probably oftenest gains an entrance to the system by the inhalation of dried and pulverized phthisical sputum, which in most parts of the world floats as dust in the air, in such quantities that it is taken in with the breath by practically everybody. In a small amount of sputum in an advanced case of the disease the germs are generally distributed with a prodigality only equalled by that of nature in producing seeds for the propagation of vegetable life. In the language of Micawber, literally "There are millions in it." This special cause, however, is powerless to act unless there be a certain *predisposition* to the disease, either inherited or acquired; in the latter case (by far more frequent) the susceptibility being developed under

the influence of certain co-operating conditions which may properly be called the predisposing causes. Such are excessive confinement indoors in bad air, overwork, mental depression, poor food, moisture of the soil, some trades and occupations, generally debilitating conditions, etc.

On the other hand, these predisposing causes, including heredity, probably never produce phthisis without the fructifying influence of the specific cause, the bacillus. The co-operation of both is as necessary in the production of each case of the disease as is the co-operation of the human father and mother in the propagation of our race. Without this predisposition or diathesis, innate or acquired, any individual may breathe in, or swallow with his food, millions of the bacilli tuberculosis with impunity; while with this diathesis or predisposition, he will escape only if he can escape contact with the bacilli, which in most parts of the world is impossible for any considerable length of time. The old parable of the sower and the seed, some falling on good ground, springing up and becoming productive, and some on stony ground and perishing, is here particularly applicable.

Naturally two methods suggest themselves to one who is anxious to prevent or to cure the disease. The first is to destroy the germs either before or after they have entered the body. The second is to so modify the soil that they will refuse to grow in it; in other words, to prevent or remove the diathesis or predisposition by invigorating the system in every known way, so that its tissues will be sterile, so far as the growth of the bacilli is concerned, affording them no proper nutriment. The fertile soil having become sterile, the bacilli which are present die, and new ones, although ingress is easy, yet fall on stony ground and perish. The greatest success in the treatment of phthisis in modern times has been along the latter lines. The brightest hope for the future shines in the same direction.

The expectation of being able to find some medicinal agent to kill the germs after they have entered the body, although so fascinating to the imagination, has probably never yet been realized.

There is, in the opinion of most physicians, no known parasiticide which can destroy the bacilli *in situ* without at the same time destroying the patient. And even if we had some reliable agent of this kind, and should actually succeed in killing in a given patient the little causes of such big mischiefs, if the predisposition were not also removed, very likely the first breath which our patient drew around the corner, or in the next street, or in the adjoining town would cause him to import a

new cargo of fresh and active germs, which would at once reinfect him and put him in the same position as before.

To a limited extent it is possible to destroy the bacilli tuberculosis *outside* the body by means of heat, sunshine and certain other agents; but when we consider the vast number of consumptives in this world which is now so cosmopolitan, and reflect on the fact that each one (unless taught to live properly) is sowing broadcast day after day millions on millions of tubercle germs, which in suitable environments, especially darkness and dampness, may retain their vitality for long periods of time, and that these consumptives often do this for months in ignorance of their real condition, to say nothing of that large class in the community, lacking moral sense, who cannot be depended on to co-operate in any good work without the strictest compulsion, what a gigantic task it will be to destroy enough of the germs to render safe those of us who are susceptible. Human nature being such as it is, what autocratic powers must be exercised, greater even than those of the Czar of Russia, to compel all consumptives to destroy their sputum? Will not the strictest supervision, enforced by the heaviest penalties, with every man watching every other man, be evaded, as the spitting laws are now? Is it not really a harder task than to kill the mosquitos which transmit malaria and yellow fever? Will not always some American citizens, so fond of liberty, claim the privilege of spitting just when and where they please, regardless of their own good or that of others? Will not some of these people deny that they have consumption? If so, can a law be enforced to seize them and have them examined? Even with the model citizen, is there not more or less time before the detection of the disease, when he may be a menace to the community? These and other questions suggest to my mind at least grave doubts as to whether the germs, the special cause of consumption, can ever be entirely eradicated. On the other hand, knowing human nature to be as it is, I have equally grave doubts as to the possibility of the total abolition of consumption's predisposing causes, such as bad ventilation, close confinement indoors, overwork, mental depression, damp soil, poor food, debilitating diseases and conditions, etc.

But, if it is impossible ever to eradicate completely tubercular disease, if like the poor we must have it always with us, is that any reason for our supinely giving up the fight against tuberculosis?

Smallpox has not yet been eradicated, in spite of wide spread vaccination since the time of Jenner. And yet all intelligent and sensible citizens bless Jenner's name, thank the Lord for his discovery, and are wil-

ling to use the proper means for preventing this fearful disease, whose terrors have been so wonderfully and so largely dispelled by vaccination.

Vice has not yet been eradicated in this country, in spite of the opposition of the committee recently appointed by Tammany.

Human nature being as it is, the difficulties in the way of the complete suppression, not only of the grosser wickedness of mankind, but also of many lesser foibles and short-comings, are gigantic indeed; and yet where is the moralist who would bid us give up this battle?

The ravages of tuberculosis have been so frightful and so widespread, that it should be fought with the greatest determination.

A generation ago our people had comparatively scanty encouragement and had some excuse for being weak-kneed; but gradual improvement has come since then. Thomas Oliver in the *Lancet* of November 10, states that between 1858 and 1860 the average number of deaths from pulmonary tuberculosis in England and Wales was 2,565 per million, while between 1871 and 1875 it was 2,218; between 1886 and 1890 1,635; in 1891, 1,599; and in 1892, 1,468. This was before the application of the best modern methods. Similar statistics have been published for parts of this country, and other more recent figures are better still.

Those of us who have been eye-witnesses of the many recoveries, during the 2½ years of its existence, at our Massachusetts State Sanatorium at Rutland, (almost one-half of those admitted, and not far from three-fifths of the incipient cases) and the decided improvement of many who did not recover, have become very enthusiastic over this application on a large scale of the modern methods of treatment in this disease, and believe that this is work in the right direction. One of the most beneficent results of this work has been, as was predicted, the educating to some extent of those with whom they subsequently came in contact by the graduates of our institution, who had there been drilled in proper hygienic living. We are aware that to know the right is not always to do the right, but the doing is difficult without the knowing.

In fine, if we cannot in this world become perfect physically, intellectually and morally, we should nevertheless strive with all our might to come as near perfection as possible. If we cannot utterly and entirely eradicate the tubercular disease in this world, yet recent experiences ought to convince us that so much can be done in this direction, to say nothing of possible improvements in treatment in the future, that

we should be encouraged to strive with all our might to come as near its eradication as possible. *Hic labor, hoc opus est.*

ADDRESS OF DR. FREDERICK I. KNIGHT, BOSTON.

After the thorough presentation of this subject by the readers to whom we have just listened, I will only endorse the movement in a very summary way.

A few years ago consumption was causing one-seventh of all deaths. This mortality in some countries had been already diminished somewhat by improved hygiene when the infectious nature of tuberculosis was established. Then the problem of combatting a disease so universally prevalent seemed appalling, so appalling that there was at first only a half-hearted effort toward this end, but the results have been so marked from even imperfect efforts that all who have followed the results cannot but have great hopes for the future. As an illustration look at the case of Prussia. Between 1889 and 1897 the mortality from tuberculosis has diminished about one-third, which can fairly be attributed to the improved methods of dealing with the disease, the Germans attacking it with their usual seriousness and thoroughness.

In grappling with the question of "stamping out consumption" we have now in addition to the old problem of fortifying the individual to resist the disease, also that of diminishing as rapidly and thoroughly as possible the chance of infection, which takes place generally through either the respiratory or alimentary tract. This can be brought about:

(1) By the physician instructing every patient how to take care of himself, or his family how to take care of him.

(2) By the government: (a) In locating all cases; not necessarily to obtrude in any way, but to be satisfied that the physician has done his duty, especially in crowded tenement houses in regard to the hygiene of the sick and disinfection of premises after death. (b) In the most thorough sanitation of prisons and other institutions where hitherto consumption has been so rife. (c) In ordinances to insure the cleanliness of theatres, public halls, street and railway cars. (d) In the proper inspection of food supply, especially of milk and meat, and bakeries. (e) In thorough cleaning and especially laying the dust of streets. (f) In abolishing smoke nuisances. (g) In the establishment of sanatoria for the cure of incipient cases of the disease, and of hospitals or homes for the advanced cases in very poor patients, who are almost certain, in the lack of proper care, to infect other members of the family predisposed by confinement, worry, fatigue, want of food and fresh air. A petition

of which Dr. Otis has spoken at length comes before the city council tomorrow night, which asks for the establishment of such a hospital or home for Boston. I will only urge you to do what you can to help this movement along.

With all these means to diminish or abolish the sources of infection, we must not lose sight of what is still a very important factor in attaining our purpose, namely, to strengthen the individual to resist the infection. The best means to this end are out-door life, good food and a judicious regulation of exercise. Some patients will recover by proper treatment, including out-door life in any climate. More recover in good climates than in bad ones. Tubercle bacilli thrive in dark, damp places, and in dark, damp climates; but besides this, a patient can spend much more time out doors, and spend it much more pleasantly in a bright, sunshiny, dry climate than in a damp, cloudy one, and it is also more invigorating to him; and here this association has still an unlimited field for usefulness, not only in providing homes in better climates for those already afflicted but for those predisposed to the disease, thereby in most of the latter cases preventing its development.

**RESPONSE BY DR. J. WARREN ACHORN, EXAMINER FOR THE
AMERICAN INVALID AID SOCIETY.**

I want to thank the physicians present here to-night, representing the Rutland Sanitarium, in behalf of this Society, for the help they have been to us, especially during the last year. I am aware that this help is all a matter of surprise to them; I know they are unconscious of having done us any greater kindnesses than they have been doing for everybody within their reach, but that makes the telling all the more enjoyable.

For years this Society has been hesitating over the establishment of a cottage colony where applicants could be placed for a longer or shorter time on probation.

In lieu of this feature, the establishment of which I have always advocated, I have made it a part of my examination to typewrite in detail the precautions necessary to be followed by every case favorably passed upon by me. I have always contended that a thorough drill in conduct prior to leaving home was absolutely essential to the greatest measure of success. How can we expect climate to cure a patient's mental and physical habits,—the habits of a lifetime, as well as his disease; climate is only one leg in the stool of health and three are needed before one can sit upon it with confidence.

And now comes the Rutland patient to the Invalid Aid Society, seeking assistance and advice as to the best possible place for him, the very embodiment of these ideas. The whole attitude of these Rutland cases has been a comfort and a revelation to me. They all have some adequate idea of what is expected of them, of how they must conduct themselves in order to secure the best results, and what the real purpose of going from home is intended to accomplish. All this is the result of proper training and discipline at the Rutland Sanitarium. I have sent patients forth, coming to us from this institution, with a feeling of confidence such as I never before experienced in connection with the work of the Society.

I believe these two organizations working together,—links in the golden chain of right life and right living, can be of the greatest support to each other. I believe a joint committee of the two should meet regularly for the discussion of questions that may properly arise, and that if they were to formulate rules of conduct for distribution among those suffering from tuberculosis and for the use of those who are to be intrusted with their own lives in sister states, or the use of physicians even, who have not made this question of conduct a study, but who are constantly called upon to pass upon the lives and future homes of many of their patients, it would all result in the greatest possible good. * *

The American Invalid Aid Society has for its object the migration of people who are suffering from climatic ills, or who have been living in an environment to which they are physically unsuited, to sections where they may be restored to health, or at least work out the measure of their years in usefulness; it has for its object the preservation of every life for whatever there is in it; it believes in the great democratic principle, that right life and right living has something more beautiful and lasting in it than notoriety and the accumulation of wealth through competition.

These certainly are lasting principles:—they should be cultivated everywhere in view of the stress and destruction to human life, usefulness and happiness going on, the outgrowth in the main of the exactions of modern civilization. * * * *

I have always felt that under our modern civilization the survival of the fittest is the survival of the best. At any rate, it is nature's law as applied to the present age of doing things.

Good health generally means usefulness or something to do, even if it isn't usefulness in the best sense, and health and something to do come nearer to producing happiness or a contented mind than any two

controlling factors the operation of which I am willing to vouch for.

Surroundings, work, dress, habits of mind and body,—whether one is optimistic or pessimistic,—have to do with determining the measure of one's happiness, but after all health is the first consideration.

Under our present system of living and doing, where competition is the basis of all endeavour, a large measure of the work of people living in the civilized world, is lost. The strong overpower the weak and either kill them outright or have them to care for as invalids. * * *

Doctor Holmes said, the best guarantee of longevity is an incurable disease. The Pope declared, in a recent interview, that few people know how little they can live on and not starve to death.

Everybody is here for a purpose,—to do some part of the world's work; it is a part of the Great Plan, and to that end the strength and usefulness of every living creature should be fostered.

Equality of ability among men is an unknown thing; all cannot do the same work or work equally well, but everyone can, if properly trained and cared for, no matter what their limitations, do something useful, and be counted as *red* bricks in the Great Wall of the world's progress.

Then indeed it would be hard to determine whether the weak or the strong are the fittest to survive. (The windows in this wall, of course, should be surrendered to kings, queens, and presidents of the United States.) * * * * *

I regard the functional diseases of a chronic character and many organic diseases, nothing more than checks placed upon those who have for generations broken nature's laws. It is a part of the Great Plan, on the one hand a check, on the other a stimulus. People suffering from disease the world over are but so many soldiers of different armies passing in review that the minds of men may be stimulated to the care and cure of all such. Stop the acquiring of disease through the forfeiture of the laws of nature already known, and a thousand years will find it an unknown thing among men, except, perhaps, for infectious diseases not yet recognized.

We have all had two grandfathers but mighty few of us had two good ones. The marriage certificate should rest upon the corner stone of health, it should not be based upon collateral entirely or sentiment with no sense back of it.

The time will come when every person's work in the world will be represented by a brick in the wall capable of holding up *two*, or as many as may be piled upon it for all time.

REVIEW OF CURRENT LITERATURE.

BACTERIOLOGICAL EXAMINATION OF THE BLOOD IN PULMONARY CONSUMPTION.

Lasker (*Deutsche Aerzte-Zeitung*, January 15, 1901) states that while in the first stage of pulmonary consumption fever is either slight or absent, as the disease advances a high, remittent fever develops, the so-called hectic. While in individual cases this fever may be due to the bacillus tuberculosis, the usual cause is mixed infection, other bacteria being responsible for the temperature. In the pus of cavities or in the bronchi, the strepto-, staphylo-, pneumo-cocci, influenza bacilli, etc., and a germ resembling the smegma bacillus may be seen in association with the bacillus tuberculosis.

Fever can only be caused by absorption of the toxins of some of these germs or by the penetration into the blood of the germs themselves. For eight years past numerous studies have been made of the blood of tuberculous patients. In all researches the principle has been the same: blood as sterile as possible was taken from the patient and conveyed to a suitable nutrient medium. Any cultures which resulted were then subjected to bacteriological study.

The first publication upon this subject was by Jakowski. In 7 out of 9 cases he got positive results, finding the streptococcus alone in 2, staphylococcus in 4, and both kinds in 1. A mouse, inoculated with cultures from the blood of one of the staphylococcus cases died after three days of sepsis. The patient who furnished the blood had but little fever.

Hewelke made extensive studies of the blood of phthisical patients, 27 in number. He found bacteria in 14 cases, one-half of which showed staphylococci and the remainder unknown or non-pathogenic germs.

Schabad examined 7 patients, the blood being taken either from the pulp of the finger or from a vein. He obtained the staphylococcus all but once.

Petrushky obtained blood by means of wet cups and used but a few drops of the blood for sowing cultures. In 8 cases he obtained but one positive result, finding both staphylo- and strepto-cocci. A mouse inoculated from these cultures remained in good health.

Huguenin found streptococci in the blood of a tuberculous spleen, but made no cultures.

Straus obtained purely negative results in a study of the blood of 19 patients.

Sittmann studied 5 cases, taking blood from a vein in the arm, subcutaneously. He used two cubic centimeters blood for cultures. In one case having constant high fever, he was able to cultivate from the blood obtained just before the patient's death, numerous colonies of white staphylococci: in the other cases, the results were practically negative, although a very few white staphylococci were seen.

Kraus obtained positive results in but one case out of 14 (staphylococci). The case is open to criticism.

In the author's clinic Hirschlaff has studied the blood of 35 consumptives, and got positive results in but four cases (staphylococcus albus). The germs need not necessarily come from the lung in these cases, as other foci of disease may coexist.

Bonardi obtained one positive result. Michaelis and Meyer studied the bacteriology of the blood in cases which gave the diazo-reaction in the urine, and obtained positive results.

They believe that there is a constant association of bacteria in the blood with the diazo-reaction. Other authors however,—A. Fränkel, Hirschlaff, Schröder and Nagelsbach,—were unable to find any such association.

On account of these discrepancies the present author, Lasker, has carried out some very extensive researches in this department. During the past two years he has made researches into the blood of 68 consumptives. His technique was very carefully elaborated. The blood was to be taken from a vein, and the skin over the latter was most carefully disinfected. Three hours before the puncture, the patient's arm was treated with a compress of one per cent. sublimate solution. Immediately before the puncture, the patient's arm was soaped and scrubbed with wood-wool, and then treated with alcohol and ether, again scrubbed and douched with sterile water. Two punctures were made with a metal syringe which had been boiled in water half an hour.

As nutrient-medium glycerin-agar was used, which is now known to possess considerable advantage over other media in working with blood.

The sterilized arm was now constricted with a rubber hose, which facilitated the extraction of the blood. The latter was then mixed with the culture media in the petri dishes and placed in the incubator to remain for three days, at a temperature of 37.5° C.

His results were as follows: In one case numerous colonies of streptococci appeared. This case will be described later in detail. Once there were found numerous colonies of white staphylococci. In several other

cases in which colonies developed the author was satisfied that impurities had crept in.

The patients all had either high or markedly remittent fever, and were mostly in advanced stages, a few being in the terminal stage.

Of the 68 patients 26 gave a diazo-reaction; 46 of the total number died while under observation. The case which showed streptococci in the blood was a tailor, aged 32 years, no hereditary taint, had been tuberculous for 1½ years and three weeks in the hospital. Symptoms of cavity in right upper lobe. Profuse catarrh over both lungs. Many tubercle bacilli in sputum. Fever irregular, now high and markedly remittent, of inverse type, now slight. Diazo-reaction marked on admission and throughout. Diarrhoea, uncontrolled by opium. Night-sweats, moderate.

At the time the blood was taken there was high fever. The disease is making rapid progress. Cavity probably forming in the left upper lobe.

The patient died 19 hours after blood was taken. No examination of the blood post-mortem.

The cultures of streptococci failed to kill a mouse.

Another case is given for control purposes in which with positive diazo-reaction and marked by remittent fever no bacteria could be cultivated from the blood.

The author considers that he had but one legitimate positive result in his entire material of 68 cases.

TUBERCULOSIS AND SYPHILIS.

Bernheim (*Journal des Maladies Cutanées et Syphilitiques*, October, 1900) states that one-fourth of the population of cities is believed to perish from tuberculous infection, while from one-fourth to one-third of the same town-dwellers are generally supposed to have or have had syphilis. It must necessarily follow, then, that these two maladies are frequently associated in the same individual. His study is based upon 43 patients who exhibited the lesions of both affections.

It was Michelet, the historian, who once predicted that syphilis would eventually exterminate the Latin races; and to-day we frequently hear another prophecy to the effect that these same races are being swept away by the ravages of phthisis. It must necessarily follow, then, that the two evils co-operate with each other, aggravate each other; and this

conclusion is borne out by the fact that as a general rule, mixture of infection enhances the virulence of pathogenic organisms.

As for a true antagonism between the diseases it is no longer believed to exist. In regard to the history of the coincidence of syphilis and tuberculosis, John Hunter held the opinion that if the individual was in the clutches of one constitutional disease, he was for the time immune against any other infection. Ricord pointed to the frequent association of scrofula and syphilis as a refutation of Hunter's opinion. Laennec, in speaking of the mortality from phthisis in a little seaport town, ascribed it in part to the prevalence of syphilis among the inhabitants. Lemonnier, in 1810, distinguished between a pure syphilitic phthisis, and pulmonary tuberculosis which develops in a syphilitic soil.

Bernheim divides his subject-matter under two heads. He first discusses the influence of syphilis upon tuberculosis, and then takes up the behavior of the former disease when tuberculosis is superadded. It must of course be borne in mind that each of these diseases has several different stages, and that further each affection may be latent as well as manifest.

Let us first take the case of a candidate for tuberculosis, that is to say, a person so predisposed as to be ripe for tuberculous infection. Bernheim believes that if such an individual contract syphilis, the latter does not pursue a course more severe than it does in the average of mankind.

But there is another species of tuberculizable individual. Bernheim refers here to the man originally robust who has ruined his constitution by excesses, especially in regard to alcoholics. Such an individual, while free from tuberculous inheritance and bearing no stigmata of the tuberculous diathesis has nevertheless become a candidate for phthisis and if such as he chance to contract syphilis, the latter affection pursues a severe course.

If in the two types just delineated, latent foci of tuberculosis pre-exist before syphilis is contracted, the supervention of the latter disease does not appear to precipitate the outbreak of tuberculosis in the naturally phthisical individual, but in the case of the originally sound but now broken-down patient an attack of syphilis appears to be sufficient in many cases to change a latent focus of tuberculosis into an active outbreak of that disease.

If syphilis supervene in a case of outspoken tuberculosis, the latter affection may or may not be aggravated. Jacquinet and Stieffel have published theses upon this subject. The latter relates the case of a woman who had coughed for four years. She contracted syphilis and

immediately became much worse; she could not tolerate the anti-syphilitic regimen and soon succumbed to phthisis.

Bernheim thinks it a rule with but few exceptions that in confirmed phthisis the supervention of syphilis has an aggravating influence.

If syphilis develop first and tuberculosis supervene during the secondary stage, phthisis of a most malignant type is likely to result. Jacquinet, Stieffel, Pidoux, Galliard, Fabry and others have reported observations which bear out this claim. Thus Fabry saw a case of hybrid ulceration of the penis which could have been nothing else than a tuberculous syphilitic chancre. The inguinal bubo which accompanied this lesion suppurated and Koch's bacillus was found in the pus. Secondary syphilis developed with great violence and at the same time both lungs were attacked by subacute tuberculosis and the patient lived but a few weeks.

Suppose that an individual with more advanced syphilis contract tuberculosis. Jacquinet's thesis contains four cases in which phthisis supervened upon tertiary syphilis, and Bernheim's material includes a parallel series.

From an analysis of these and similar cases it would appear to be the rule that the evolution of tuberculosis in the presence of tertiary syphilis is decidedly slow. This fact is so paradoxical as to need some explanation, and eminent clinicians have advanced different hypotheses. The consensus of opinion appears to be that in tertiary syphilis arteriosclerosis is very prone to develop. The fact has also been noted that tuberculosis tends to pursue a torpid course in arterio-sclerotics, possibly because of the high arterial tension.

Bernheim now discusses some of the aspects of the symbiosis of these two diseases. First, how common is the coincidence of these diseases in the clinic? Sandwith found that of 400 consumptives seen in hospital practice in Cairo the majority had syphilis. Fränkel once reported a series of 247 cases of phthisis in syphilitics. Tharescu examined 318 syphilitics for tuberculosis and found but 16 cases. Statistics of this sort, however, do not aid us much in reaching a conclusion.

The consensus of opinion is that syphilis may predispose to tuberculosis through the anaemia induced. Tournier has frequently seen young syphilitics develop phthisis, and he therefore places syphilitic infection among the etiological factors of consumption.

Victims of inherited syphilis suffer so frequently from the lesions of scrofula that in prebacillary days it was thought in some quarters that syphilis could be transmitted into the other disease. It is probable

that the syphilitic virus so affects the development of the hereditary victim of this disease that the protective epithelial coatings of the skin and mucosae are imperfectly developed, so that the bacillus tuberculosis and other germs readily penetrate within the organism.

In acquired syphilis it is believed by Taudowzy and others that if the disease attack the larynx that organ becomes thenceforth prone to develop laryngeal tuberculosis. Even if the syphilitic laryngopathy is cured the predisposition still remains. Similarly Potain traced a connection between syphilitic bronchitis and the later development of pulmonary phthisis. This secondary infection is due apparently to the fact that the lesions caused by syphilis furnish a port of entry for tubercle bacilli.

Why does such a grave type of tuberculosis develop in the presence of a florid secondary syphilis? This can only be explained by the fact that the explosion of syphilis in the blood deprives the latter of its organic defence, so that the other infectious process has a natural barrier to its extension removed.

In regard to treatment of this coincidence of disease, Jacquinet states that in the majority of cases antisiphilitic regimen has an unfavorable action upon the tuberculous individual. Bernheim himself has somewhat more optimistic views in this regard.

In concluding, Bernheim thinks it better to attribute the coincidence of these two diseases to the fact that the lesions of syphilis provide ports of entry for tubercle bacilli, rather than to any possible weakening of the resistance of the organism.

[The author might have made his paper more nearly complete by citing the demonstrations by Leloir, Elsenberg Baumgarten, Schottelius and others of the symbiosis of syphilis and tuberculosis in the same lesions (scrofulous glands, gummata). He goes too far in denying the existence of antagonism between infectious diseases, for Mauriae and others have reported numerous instances of the radical cure of tertiary syphilitic lesions by erysipelas, a streptococcus infection akin to that which complicates advanced phthisis.—Ed.]

TRAUMATIC ORIGIN OF PULMONARY TUBERCULOSIS.

Stern in his elaborate study entitled "*Ueber traumatische Entstehung innerer Krankheiten*," Jena, 1900 (G. Fischer), enters quite extensively into the part played by injuries in the causation of phthisis. It is by no means easy to show that a sudden act of violence like a contusion can

give rise to a chronic affection of any sort. The influence which an accident exerts on the production of a disease may consist merely of an acceleration of a process hitherto latent. There are numerous cases recorded in literature in which a contusion of the thorax sustained by an apparently healthy individual has been followed within a reasonable interval by the evolution of phthisis, and "traumatic pulmonary tuberculosis" is an expression which the older clinicians used with some familiarity. The discovery of the bacillus would naturally affect the status of such an affection, but modern phthisiologists and clinicians continue to use the term, and cases have been reported by Brehmer, Leyden, Jaccoud, Potain, Lacher and others. Mendelssohn in 1886 published nine hitherto unreported observations, the majority of which occurred in Leyden's clinic; and in 1891 Lacher was able to collect records of 25 cases, which number has since been increased by the investigations of Guder.

Stern here reproduces several of these cases with a view of showing that the data are defective, the source of fallacy being inseparable from the nature of the affection. Fourteen of the most satisfactory histories are tabulated, with reference to the nature of the injury, development of the disease, results of physical examination, and termination.

From a study of all the recorded material, Stern is able to show that the interval between the trauma and the recognition of the pulmonary disease was as a rule considerable, extending over months and even years. Despite all the care of the reporters to secure trustworthy data, it appears that in numerous instances the statements of the patient as to his previous health, the injury and development of the disease are wholly uncorroborated.

The occurrence of traumatic hæmoptysis, which is believed by many practitioners to be a constant phenomenon in the history of traumatic phthisis, and to constitute a sort of justification for belief in the existence of this type of consumption, appears to fail in a number of cases; but in some cases in which no hæmoptysis occurred we find a history or evidence of an acute contusive phenomena. In several cases there is no mention whatever of any acute reaction or initial stage following closely upon the injury, although it would not be just to conclude that the failure to record such symptoms is proof of their non-existence.

A study of the recorded material gives the impression that in so-called traumatic phthisis the individual differences observed are on a par with those which obtain in an equal number of cases of non-traumatic

phthisis. In other words there is nothing classic or characteristic in the affection under consideration.

Although it appears that traumatic phthisis is not only extremely infrequent in literature, but decidedly vague as to distinctive qualities, the question of dependence of pulmonary tuberculosis upon accidents and trauma in general is possessed of no little forensic importance. Medical opinion is not rarely sought in the courts in regard to the possibility of the origin of tuberculosis from injury in connection with suits for damages, accident insurance, etc. In cases of this sort the medical witness has a difficult task. An opportunity of examining the chest soon after the injury is requisite for the determination of the existence of pretraumatic pulmonary lesions. Repeated examinations would also be a desideratum in these cases in order to detect, if possible, the inception of the disease. The long incubation period which occurs as a rule in these cases makes the subject of repeated investigation one of great significance. If the disease first appear in some lobe of the lungs remote from the site of the injury the evidence as to any connection between the injury and the disease would be much weakened. As a matter of fact, in a considerable number of cases, the development of the disease in the lobe corresponding to the injured locality is distinctly stated.

Of still greater importance in these cases is the evidence that the injury actually produced at the time of its occurrence a traumatic pneumonia. Haemoptysis closely following the injury is a document in favor of the existence of a causal relationship; but absence of haemoptysis does not exclude such relationship.

A complete chain of evidence would be (1) injury, (2) traumatic pneumonia, (3) development of tuberculosis on the pneumonic substratum without any interval of recovery.

Stern now gives two typical cases in detail. He first relates the particulars of an instance of traumatic phthisis in which there could be hardly a doubt as to legitimacy. In the second case the facts are such that grave doubts would naturally attend the claim that the disease was a result of the injury.

In the first case the conditions previously laid down for the recognition of genuine traumatic phthisis are found to be fairly well represented. In the other example the injury and debut of the disease were on opposite sides of the chest.

RELATIONSHIP BETWEEN THE TUBERCULOSIS OF WARM AND COLD BLOODED ANIMALS.

Auché and Hobbs (*Arch. de méd. expér. et d'anat. path.*, T XII, 1900, No. 4; Ref. *Centralb. f. Allg. Path. u. path. Anat.* Bd. XII, No. 4) sought to determine whether any relation existed between human, fowl and fish tuberculosis by inoculation of frogs, mammillian and avian tubercle bacilli.

Though feeding experiments and subcutaneous injections were unsuccessful, intraperitoneal inoculations were in a sense successful.

The results of their experiments were as follows:

1. Mammillian and avian tubercle bacilli exert a positive chemotactic action on the leucocytes of the frog.
2. The leucocytes are actively phagocytic for these bacteria.
3. Granulations consisting of bacilli surrounded by an areola of round cells, were formed on the mesentery, on the surface of the liver and with less frequency on the parietal peritoneum and the surface of other organs. These granulations are formed only around groups of, never around isolated bacilli. These tubercles do not increase in number. The inclosed tubercle bacilli gradually decrease in number, but never disappear entirely—no tubercles without bacilli being found.

Only occasionally are these tubercles found in the parenchyma of the abdominal viscera. The isolated bacilli may be found irregularly scattered about in the parenchyma of the viscera, even after weeks, but without having produced any structural changes in the tissues.

4. The virulence of the bacilli was little affected by their sojourn in the frog's belly; inoculation of guinea pigs being always followed by tuberculosis.

5. The bacilli did not proliferate while in the frog.

6. Dead tubercle bacilli produced identical results.

These experiments go to show that human and fowl tuberculosis cannot be transmitted to cold-blooded animals.

ANO-RECTAL FISTULAE WHICH ARE PREMONITORY OF PULMONARY TUBERCULOSIS.

Barié. (*Journal des Practiciens*, January 12, 1901) begins a short paper on this subject by reminding the reader that neither Louis nor Laennec were familiar with the frequent coincidence of anal fistula and phthisis; although there was a general belief that such an association was of very common occurrence. Andrae found but one case of fistula in a material of 800 consumptives.

At a later period the surgeons Mollière in France, and Paget in England showed that anal fistula was far more common in tuberculosis than the distinguished medical clinicians had been willing to believe. Bodenhamer, the rectal specialist, made the coincidence amount to 8 per cent. of fistula in consumptives. Allingham increased this percentage to 14 per cent., and Spillman, in a very large material of tuberculous individuals made the proportion over 30 per cent.! There is evidently some source of fallacy in these high percentages, because the latest and most carefully compiled statistics tend to fix the frequency of fistula in the phthical at about 5 per cent.

The moment at which the anal lesion develops is extremely variable, but as a rule the pulmonary affection has become confirmed if not actually far advanced.

The author has a personal series of five cases which shows plainly that the fistula may precede the evolution of the lung disease. To this premonitory type of fistula he restricts the balance of his article.

The anal lesion may antedate the pulmonary disorder by several years. Facts of this sort, while chiefly ignored, are by no means unknown in literature. Pourieux, for example, reports several cases in a thesis published in 1874.

In the present author's series of five cases the interval between the appearance of the fistula and the debut of the pulmonary mischief varied from 18 months to 4 years.

In three of the five cases the abscess which preceded the formation of the fistula came about spontaneously, while in the other two cases it had a traumatic origin. In the latter the perineum was injured by direct violence, phlegmonous abscesses promptly formed and were evacuated, but there was no subsequent tendency for the resulting fistula to close. The health of the two patients appears to have been good at the time of the traumatism and for a long period afterwards. Phthisis supervened in the customary manner by a failure of the general health, cough, haemoptysis, etc.

The author's conclusions are as follows:

1. In tuberculous individuals an ano-rectal fistula may precede for a long period—even several years—the appearance of the first pulmonary manifestations.

2. These fistulae usually result from abscesses of spontaneous and insidious development; but in certain cases they may succeed to local traumatism.

TUBERCULOUS RHEUMATISM.

Maillard (*Gaz. hebdom. de méd. et de chir. de Paris*, Nov. 4, 1900) applies this term to various articular and other affections of tuberculous nature which simulate ordinary rheumatism.

Prof. Poncet was the first to employ this term, in 1890. He thought that since gonorrhoea, scarlatina, typhoid fever, and other infectious diseases often attacked the joints, tuberculosis ought to exhibit the same tendency.

Since rheumatism is known to be practically a symptom of various diseases, it might also prove to be due, in certain cases, to tuberculosis.

These forms of symptomatic rheumatism he chooses to call *infectious pseudo-rheumatism*. Koch's bacillus should be able to cause such a condition, from analogy.

Poncet goes further, and states that a high degree of infection might produce, instead of ordinary rheumatism, symptoms of dry caries and other organic lesions of the typical tuberculous joint. There is here an analogy to the organic changes, the ankylosis, deformities, etc., which sometimes succeed to simple rheumatism.

Again, it is not necessary to regard tuberculosis as invariably destructive to the joints. For all we know, a mild degree of virulency may cause the very same type of productive lesions which are seen in ankylosing and deforming arthritis of rheumatic origin in the narrower sense.

In 1893 Weill of Lyon, after analysing the cases of numerous consumptives, found 20 with osteo-arthralgia—13 times in the hip and shoulder, 8 times in the knee, etc. In these cases pain was present only on pressure. There was no redness or swelling.

Poncet has seen this very same tenderness of joints accompany or precede the development of surgical tuberculosis. Thus a patient with Pott's disease was found to present tenderness in almost all his joints, and the same was true of a girl with a white swelling of the knee, who had also exhibited a migratory and transient swelling of several of the larger joints. Examples of this sort could readily be multiplied.

The author now recited a number of cases of which the titles only are here produced.

1. Acute articular rheumatism, followed by tuberculous osteo-arthritis of the right knee. Death from tuberculous meningitis followed arthrotomy.

2, 3, and 4 are cases of the same type.

5. Acute polyarthritis in the course of pulmonary tuberculosis. This case appears to be the only one given in which joint disease was associated with pulmonary tuberculosis.

The balance of the article is largely surgical in character. In summing up, the author cites Berard and Destot (Surgical Congress, 1897) on the subject of the deforming polyarthritides of tuberculous nature. These authors make three distinct types: 1. The patients presenting this disease are of the tuberculous diathesis only. 2. The polyarthritis is preceded by pulmonary tuberculosis. 3. It is preceded by an ordinary tuberculous joint, such as white swelling of the knee.

The author suggests that in all suspicious affections of the joints, we should test for the presence of tuberculosis by the serum-reaction. Whenever cases of arthropathy do not respond to the classical treatment for ordinary rheumatism, (sodium salicylate, antipyrin, etc.), they should be regarded as specific.

In respect to the treatment of tuberculous rheumatism, there should be some means to cut short the initial stage and prevent the formation of destructive or crippling lesions, to say nothing of the onward march of the tuberculous factor in the organism.

Our general resources must be made up of air, rest and over-feeding.

Locally massage, revulsion, immobilization, come into play according to the nature and degree of the malady. As a specific, almost, for these lesions, Poncet recommends the sun-bath, as described in Millon's thesis, Lyon, 1899.

PRIMARY TUBERCULOUS ULCER OF THE SKIN OF THE PENIS.

Tschlenoff (*Archiv für Dermatologie und Syphilis*, January, 1901) speaks of the infrequency with which this affection has been noted, which, however, does not signify that the lesion is absolutely rare. A search into literature reveals the fact that nearly thirty authors have written upon this subject, but of the cases reported the majority were secondary to tuberculosis elsewhere in the body. By the term secondary the author includes not only cases of haematogenous transmission but others in which auto-inoculation figured. There is quite a series of the latter on record in which the penis became infected in conjunction with urogenital tuberculosis.

Excluding all these cases of secondary infection, together with inoculations of newborn infants in connection with the ritual circumcision, the number of cases of tuberculosis of the penis is extremely small.

Pospelow saw, he thinks, an undoubted case in his private practice which is herewith reported for the first time by the author. The patient was a man aged 43 years, with good family and personal history; his wife was free from disease, but five of their six children died early in life, and there was a history of one abortion. For some time the patient had been irregular in his habits, using alcoholics habitually. A thorough investigation showed a considerable disposition to neurasthenia. No history of evidences of syphilis could be obtained, the patient owning up, however, to gonorrhoea and chancroids. Four months before consultation an ulcer appeared upon the penis. It began as a mere excoriation which refused to heal and slowly increased in size. Beginning in the prepuce the disease extended upon the glands causing a deep loss of substance. The wall of this ulcer was steep, elevated, very firm, irregular in outline which was dentate and as if gnawed in places. The hard uneven floor of the lesion was covered with a sero-purulent secretion. No miliary nodules could be seen.

This lesion was destitute of pain and was uncomplicated with lymphangitis or adenopathy.

In making a diagnosis of this case hard and soft chanere could be at once excluded, but the possibility of gumma or epithelioma required elimination. Under potassic iodide no improvement was observed and the diagnosis between epithelioma and tuberculosis was settled by submitting an excised portion of the growth to the microscope. Not only did the specimen present the histological characters of tubercle, but tubercle bacilli were found. An operation was proposed to the patient but the latter disappeared and his fate is unknown.

The apparently sound health of the patient, the author thinks, justified the diagnosis of a primary tuberculous lesion. Infection could not have taken place from tuberculosis of the urogenital apparatus, nor had there been any exposure analagous to circumcision. The case therefore, seems to be a class of itself, and its origin is involved in much obscurity.

The question as to the possibility of infection by coitus requires discussion here. The majority of authors believe in such a possibility, although an author like Guyon disputes the claim that tuberculosis is ever transmitted in this way.

Dobroklonsky, an author who has devoted much attention to this subject, sums up the evidence which points to the genital method of transmission as follows:

1. There is undoubtedly a primary tuberculosis of both the male and the female genitals.

2. The cause of the disease could readily contaminate the secretions of the organs in both sexes.

3. The transmission of tuberculosis is possible if the infectious matter is brought in connection with the mucosa of the genitals.

Apparently there has never yet been reported a case of transmission to either man or woman by coitus. Professor Ssalistscheff reported an instance of tuberculosis of the penis in 1894, which he regarded as having been contracted by the patient from his wife. Unfortunately, however, Ssalistscheff did not see the woman, and his opinion was based upon the husband's statement that within the past six months his wife had begun to cough and emaciate.

In the present author's case the drinking habits and irregular living of the patient had exposed the latter to the possibility of contamination from numerous prostitutes as well as a mistress. His lawful wife was in perfect health, and examination of the other women could not be brought about, nor could the patient furnish any information as to their state of health.

ON THE SIGNIFICANCE OF THE TONSILS OF YOUNG CHILDREN AS PORTS OF ENTRY FOR TUBERCULOUS INFECTION.

Friedmann (*Beiträge zur pathol. Anatomie und zur allgemeinen Pathologie*, Bd. XXVIII, No. 1) adduces a series of nearly 150 cases of pulmonary and glandular tuberculosis in very young children in which the tonsils were examined for the presence of bacilli and tuberculosis.

The number of positive results obtained was extremely small. The author speaks of four or five unobjectionable cases and others concerning which some doubts were present. The tonsil does possess some significance as a port of entry for tuberculosis, because in these positive cases acute primary tonsillar tuberculosis was present without the coincidence of any other tuberculous focus throughout the body.

It is difficult to determine the manner in which the bacilli reach the tonsils. These micro-organisms possess no power of active movement, and it is assumed that the lacunae must possess the faculty of suction, since particles of carmine and coal dust are able to penetrate into these crypts. It is held by investigators in this field that the bacilli can penetrate into the lymphoid tissue without any injury to the epithelia, and

the author himself has several times encountered them *within* the latter.

Supposing that the bacillus has attacked the tonsil, causing acute tonsillar tuberculosis, to what extent does this local infection menace the general health?

It is quite possible for this local affection to heal, but such a termination must be regarded as infrequent. The tendency is for the bacilli in the tonsil to be carried by the lymphatics to the cervical and thoracic glands. Dmochowski once succeeded in finding bacilli in the lymphatic vessels which lead to the superior cervical glands. In nearly all of the author's material the cervical glands were either caseous or, at least, swollen.

In one particular case the praetracheal glands had become involved. The coincidence of scars in the tonsil with cheesy cervical glands is said to be quite common.

May the tonsils furnish a port of entry for general infection without themselves becoming tuberculous? This question is difficult to answer, but a negative reply would doubtless be correct. With a single exception the present author never found bacilli in the tonsils without the presence of pathological changes.

Friedmann's personal belief is that in cervical-gland tuberculosis, the tonsil represents the port of entry. His conclusions in general are as follows: The tonsils of very young children have some bearing as a port of entry for tuberculosis. While the actual proportion of such cases is small, we must bear in mind that tonsillar tuberculosis is not always readily recognizable. The specific process may have terminated in cicatrization, or the technique may have been inadequate to reveal the bacillus. The hypertrophy of the tonsils which may be seen in healthy children is probably of tuberculous character only in the rarest cases. The mode in which the tonsil is primarily infected is probably connected with alimentation.

THE EMESIS-PRODUCING COUGH OF THE TUBERCULOUS AND ITS TREATMENT.

Derscheid (*La Policlinique*, January 1, 1901) refers to the paroxysmal cough of phthisis which ends in producing nausea or vomiting. This phenomenon is of frequent occurrence. It occurs in the morning on first waking or after a meal. In the last case it may appear directly after eating or from a few minutes to an hour after the meal. The

author does not here refer to the vomiting of phthisis when it occurs independent of coughing.

To take a common case: A consumptive reaches the first or second stage of his malady, his cough becomes paroxysmal and is followed by nausea or vomiting. These phenomena may occur two or three times daily or every two or three days. They may appear with some regularity or none at all. In the fasting stomach, in the morning the trouble may be precipitated just as the patient rises from his bed. The paroxysms occur more commonly with a full stomach, especially after the evening meal.

Notwithstanding the gastric disturbance the digestion appears to be fair, the tongue clear, bowels active, etc. Some consumptives can begin to eat a few minutes after vomiting. An especial acceleration of the ordinary breakdown of phthisis is caused by the emesis; and the patient's resistance appears to be lowered if the symptom persists.

What is the cause of this vomiting?

Broussais ascribed it to gastritis; others think it due purely to the cough, but we do not appear to find emesis associated with cough of other diseases. Marfan explains the phenomenon by a special irritation of the vagus through irritation of the gastric mucosa by the food. Doubtless the irritable state of the vagus contributes to the presence of the symptoms.

The most rational explanation is that two very different factors may produce this phenomenon.

1. Compression of the vagus by the enlarged tracheo-bronchial glands at the hilum of the lung. This compression does not occur with great frequency.

2. Pharyngeal irritation. Berthier states that the vomiting is due to hyperaesthesia of the pharynx. This irritability is due to the frequent passage over the throat of tuberculous sputum.

A "stomach cough" in the literal sense of the word does not exist, although these paroxysms are more likely to occur when the stomach is filled.

Treatment. This emetising cough requires prompt and energetic treatment, and many plans have been followed.

Peter recommends a fly-blister over the pit of the stomach, and a few drops of laudanum after each meal.

Willez used a solution of bromide of potash for its anaesthetising action upon the throat.

Gueneau de Mussy: Plasters over the pit of the stomach composed of diachylon, theriac and extract of belladonna.

Lasecarret and Ory: Solution of cocaine, 5 per cent., to pharynx after each repast.

Bonet: Bromides internally before eating.

Berthier: Cocaine to pharynx in powdered form.

Mathieu: Solution of chloroform or bromoform in water.

Gallois and Bonn: Good results with hydrogen peroxide.

Darembert: Same as preceding; chlorhydric acid after meals; exclusive milk diet for 15 days; laudanum after meals.

In short the remedies are numerous and varied. In the author's experience this treatment may be simplified. His management always gives him excellent results.

He experimented in over 100 cases in the service of Godart-Danhieux. This material was submitted to treatment by three methods.

1 Pharyngeal applications: Only 2 per cent. cocaine was used. After several days the paroxysmal hyperaesthesia disappeared and emesis ceased. The remedy is powerful and efficacious and the bitter taste is a great drawback. The effect of the cocaine shows that the cough, etc., depend upon pharyngeal irritation.

2. Hydrogen peroxide: An efficacious remedy which deserves to be employed. The remedy should be mixed with wine—one soup-spoonful to a litre (10 volumes). It acts in small dose, is easily taken, no bad consequences.

3. Chloroform water is equally good. Formula as follows:

R.—Eau chloroformee 40.0

Syr. diacod

Orange flower water, ana 30.0

Distilled water 100.0

Sig.: One soup-spoonful after each meal.

We do not know the rationale of the action of the hydrogen peroxide.

As for the chloroform it is a sedative to the throat, and acts, besides, directly upon the gastric mucosa.

NASAL COUGH IN THE TUBERCULOUS.

Revillet (*Lyon Médical*, October 28, 1900) states that this phenomenon is common enough in pulmonary tuberculosis, in which affection it is superadded to the bronchial cough. It may depend for its existence upon any one of a number of intranasal or naso-pharyngeal affections

which when present tend to obstruct the respiration—adenoids, polypi, deflected septum, hypertrophic rhinitis,—and also may be caused by ozaena.

The frequent association of all these affections with pulmonary tuberculosis has been ascribed to the fact that these nasal disorders actually predispose the bearer to phthisis.

Within the present year Révillet has seen an entire series of these cases. The case with which the patient may be freed from his nasal cough has induced the writer to publish his paper.

The actual mechanism of the cough is not a reflex, but is explained by the backward flow of secretions from the nose into the naso-pharynx and thence to the pharynx and larynx. Arrived at the aryepiglottic folds a sensation of tickling is caused, and a paroxysm of coughing results which does not produce sputum, and which tends to wear out the patient in his attempts to dislodge the cause of the irritation. This sort of cough is worse at night, and leads to insomnia.

The diagnosis is readily made by the presence of muco-pus on the posterior wall of the pharynx. These patients do not have much discharge from the anterior nares, as all the secretions appear to escape posteriorly. Cough often sets in the moment the patient's head touches the pillow and continues until he raises his head again.

In cases of this sort we also find a disparity between the amount of expectoration and the auscultatory chest signs, the former being profuse while the latter are very slight. The fact that a patient has produced a copious amount of sputum over night should lead one to suspect its nasal origin.

A case is briefly cited: Female, age 47; has coughed for a year and had several haemoptyses; physical signs of moderately advanced infiltration of right apex. During the day she has a dry cough with slight expectoration; but as soon as the patient goes to bed cough becomes incessant with abundant expectoration. Insomnia is naturally produced, and as a second effect of the cough, profuse sweats. Half a litre of sputum collects every night.

Examination of the nose shows hypertrophy of the turbinates, the nasal chambers being nearly obstructed. Pharynx bathed in a thick layer of grayish muco-pus.

Weber's douche was employed using sulphurated water, with the result that the discharge, cough and sweats were rapidly ameliorated.

Other methods of treatment consist in the use of boiled water to which

sea-salt has been added, or solution of boric acid, etc. Also powders of boric acid, menthol, cocaine. It may be necessary to apply the galvanocautery to the turbinates.

LIGNOSULPHITE IN THE TREATMENT OF TUBERCULOSIS.

Danegger of the Planegg Sanitarium for Consumptives, has published an elaborate study of this new antituberculous remedy in the *Deutsch. Arch. f. klin. Med.* (Sept. 27, 1900). The researches were made under the auspices of the Pharmacological and Medico-Clinical Institute at Munich.

The origin of the use of this substance in phthisio-therapy is as follows: in 1892, an American physician, Dr. Hartmann, who was at the time at Hallein, near Salzburg, recommended the fumes which arise during the manufacture of cellulose as an antidote to the exciting cause of tuberculosis. Apparatus for the generation of lignosulphite was forthwith introduced into various sanatoria and clinics, and very soon there began to be circulated conflicting reports as to the efficacy of the new resource.

The inhalations which have been recommended in phthisio-therapy since 1882, have been as a rule antiseptics. Since that date many kinds of vapor containing sulphur have been recommended for this purpose. Sulphurous-acid gas has naturally been the most popular in this connection, and is, as is well known, the principal constituent of lignosulphite. Scattered references as to the efficacy of sulphurous-acid fumes in phthisis may be found in literature for the past century or more, and Hartmann is said to have received his suggestion as to the use of lignosulphite from the fact that in 1890 a tuberculous subject was restored to health after inhaling the fumes in the Delary Cellulose Factory in Sweden; together with evidences of a general belief, which dates back to 1870, that workmen and neighbors have been cured of tuberculosis by inhalation of the fumes incidental to the manufacture of cellulose.

Thus far but little has been published with regard to lignosulphite. In addition to Hartmann's original articles, issued in pamphlet form, the principal contributions have been made from laryngological clinics (Chiari, v. Schrötter.)

Lignosulphite is prepared as follows: wood of the pine and fir species finely divided, is treated with concentrated sulphuric acid and lime. The resulting solution contains the ethereal oils, resins and mineral

constituents of the wood, and a certain amount of sulphurous acid. Since the woody fibre becomes transformed to cellulose, the lignosulphite represents a by-product.

As thus prepared lignosulphite does not have a constant composition, and undergoes further changes after bottling. The volatile sulphurous acid is clearly the active therapeutical constituent and the quality of the lignosulphite must be ranked in accordance with the amount of this chemical in the volatile state.

The method of administering the lignosulphite is of the greatest importance, and to errors of technique, the author thinks, must be ascribed the numerous instances of failure reported at clinics and sanatoria.

Hartmann advocated the decanting of the remedy into a saucer filled with wood-chips, or straw, but the author believes that a special inhalation apparatus ought to be used, which principle has also been carried out by Hartmann, although he does not believe it indispensable. The author, after experiments made with numerous apparatus, recommends the Schreiber vaporizer, or as a make-shift a wide-mouthed bottle provided with a funnel.

With regard to the mode of action of the remedy, claims have been made that it is antiseptic and disinfectant, and Hartmann regards it as having a bactericidal power, which perhaps acts indirectly. All physicians who have employed lignosulphite agree that it acts as an expectorant. Finally it appears to have a direct roborant effect on the general nutrition.

Danegger proceeds to analyze the mode of action with greater precision. He tested the tubercle bacilli with sulphurous-acid fumes, and found that they offered much resistance to its bactericidal action, especially when in the sputum. The beneficial action of the remedy appears to be chiefly due to the fact that it dissolves the tenacious mucus and thus facilitates expectoration. By virtue of this property it diminishes the exertion of coughing, enables the lungs to secure better ventilation and favors deep breathing.

Danegger also tested lignosulphite from the clinical stand-point, and his results here are in full accord with those obtained in the laboratory. The drug is not a cure for tuberculosis, but through its property of chemically destroying mucin will be found a valuable adjuvant to other therapeutic resources.

It must not be overlooked that the abuse of lignosulphite may, through its sulphurous acid exert a poisonous action upon the mucosa

of the trachea. The epithelia are destroyed, with injury to the walls of the blood-vessels, transudation of serum, haemorrhages and finally fatal pulmonary oedema. The toxicology of the drug has of course been studied only in animal experiment, but is to be also inferred from the known toxic properties of sulphurous acid.

FERSAN.

Pollak of the Alland Sanatorium, in the course of an article on the new medicaments in phthisio-therapy (*Wien. klin. Wochen.*, June 21, 1900) has the following to say concerning Fersan:

The state of the blood plays a most important role in tuberculosis. not only during the course, but also at the beginning of phthisis. The anaemia of advanced stages of the disease is characteristic. It is the more astonishing, then, to learn that the chemical and morphological alterations of the blood do not correspond to this clinical condition; in most cases the blood corpuscle count and per cent. of haemoglobin stand in no relation to the apparently high degree of anaemia.

In the initial stages of tuberculosis Grawitz and Strasser found the number of red corpuscles greatly diminished, the white corpuscles fluctuating in numbers and the haemoglobin reduced in amount. Whenever there is a gain in weight and improvement in the condition of the lungs the red corpuscles again increase in number and the haemoglobin in amount. Hence the aim of the therapist has been to hasten the regeneration of the blood, and he resorts to preparations of iron and arsenic.

Most iron preparations have undesirable collateral effects, especially irritation of the digestive tract. Chemists tell us that man can absorb but 0.0479 gms. of iron per kilogram of his weight; in other words a very minute amount of iron is sufficient for the blood and no more can be absorbed—so that all excess over this absorbable quantity is useless and mischievous, tending among other drawbacks to destroy the appetite.

Dr. Ad. Jolles' new preparation, fersan, contains iron and phosphorus. It is said to be made from the erythrocytes of beef's blood, the iron occurring in its natural combination, and is a ferriferous para-nucleoproteid. The albuminoid substances of the erythrocytes are split up, one of the products being free from phosphorus and soluble, in its nature analogous to the "histon" of the leucocytes; while the other contains both iron and phosphorus, and is free from alloxuric bases and nucleinic acid. This second substance is fersan.

Fersan is also soluble in water, and is not coagulated by heat. It is said to pass the stomach unchanged and to be first absorbed by the intestines. It contains 90 per cent. albuminoids.

Pollak has used fersan at his sanatorium in 50 cases, selecting as the chief indication *anaemia with notable failure of appetite* (often associated with anaemic headache). The results of the treatment are in part as follows:

In three patients fersan had to be discontinued after 2 or 3 days because of vomiting after each attempt at ingestion (one patient), or incoercible repugnance to the medicament.

In all the other cases fersan gave good satisfaction. There were no instances of stomachic disturbances in this series. A teaspoonful dose was mixed with water in a glass, which latter was filled with cold boiled milk. In this way, 7 to 8 grams of fersan were ingested daily in doses of 2.5 gms. half an hour before meals.

One patient, a 17 year old girl, took fersan 2 months. Her haemoglobin went from 65 to 80 and she gained about 12 pounds during the treatment. This case is given typical of the series. The average gain in haemoglobin during 2 months was 15 to 20 per cent. All but 8 patients gained proportionally in weight.

Fersan is almost tasteless and does not injure the teeth. Pollak thinks the results obtained by him justify the use of this preparation in cases which are refractory to the ordinary treatment of sanitarium cases.

EDITORIAL.

THE GENESIS OF THE TUBERCLE.

Few subjects in pathology have been the source of more careful investigation and learned discussion, than the origin of the histological elements of the tubercle. Few subjects investigated have resulted in more widely varying conclusions. Baumgarten in his thorough study of tuberculosis in the anterior chamber of the eye, found that the fixed tissue cells, epithelia, endothelia and connective tissue cells, underwent karyokinetic changes to directly form epithelioid cells, that these in turn were the source of giant cells. Metschnikoff with equal emphasis declares that they find their origin not in the fixed cells, but exclusively in the mononeuclear leucocytes.

Others, Ziegler, for example, have taken a more conservative position and are of the opinion that either or both may be the progeners of these cells. Such widely differing opinions from men of equally high authority make any new evidence which may throw light upon the subject, of more than passing interest, whether it support one side or the other.

B. Dembinski publishes in *Przegląd lekarski*, 1900, No. 15, the results of a series of experiments carried out by him in the Pasteur Institute in Paris. He made intra-peritoneal infections in rabbits and studied the progress of development in the omentum. On account of the difficulties attending the microscopical examination of the living omentum, he found that method unsatisfactory, and therefore based his conclusions more upon the results of examination of hardened and stained preparations of small portions of omentum excised at regular intervals. These preparations showed that the tubercle bacilli are first surrounded by polynuclear leucocytes and two days later by mononuclear leucocytes; and these cells alone, the fixed cells playing no part, form the histological tubercle.

In order to support this position he made an additional experiment, a small piece of cotton covered with dead tubercle bacilli was placed in the peritoneal cavity and allowed to remain there for a week when it was removed. In the fluid which he squeezed out of this cotton pellet, he found "typical giant-cell tubercles."

It would seem that Dembinski's position was well taken, in holding that the fixed connective tissue cells could not have played any role in the formation of *these particular* tubercles, but that they were entirely made up from the leucocytes, whether polynuclear or mononuclear.

The substantiation of this work will necessitate the wider view of the genesis of the tubercle.

DIRECT TRANSMISSION OF TUBERCULOSIS FROM MALE PARENT.

The placental transmission of tuberculosis has been sufficiently well established to no longer admit of a doubt, but the paternal conceptional transmission has, on account of obvious clinical difficulties and for the lack of sufficient experimental research, been the source of much diversity of opinion.

For the demonstration of the *possibility* of the transmission of the disease to the embryo from the tuberculous father, *with histologically intact testes*, it must be shown:

1. That virulent tubercle bacilli do sometimes exist in the seminal fluid of the non-tuberculous testes or seminal vesicles of the tuberculous.
2. That tubercle bacilli do sometimes exist in the developing embryo (at an early period) in the non-tuberculous uterus of the non-tuberculous parent.
3. That tubercle bacilli, or tubercles, do exist in the fruit at birth, the mother having remained uninfected up to the expulsion of the fully developed offspring.

The first of these conditions is the *sine qua non* of paternal transmission. Even if this condition obtains only rarely, frequent careful examinations of recent cadavers should still be rewarded with occasional positive findings. For one reason or another, only few of the reported positive findings have been considered entirely trustworthy; Jani, for example, demonstrated microscopically the presence of bacilli in five cases, but did not prove the virulency by animal experiment; another investigator demonstrated the bacilli microscopically, by the animal experiment, and by the culture experiment, but the accuracy of this work was cast in doubt on account of the almost insurmountable difficulties

attending the direct culturing of tubercle bacilli from the cadaver. However, we have a few positive reports which withstand the most critical investigation, and these, so far as possibilities are concerned, outweigh the great number of negative reports. On the other hand the preponderance of negative reports indicate that the presence of tubercle bacilli in the seminal fluid of non-tuberculous testes must be a very rare occurrence.

The second condition must, of course, be demonstrated on the lower animals. For this, it must be absolutely certain that seminal fluid containing virulent bacilli has entered the vagina and uterus; which organs must be subsequently demonstrated to have been non-tuberculous, in order that not only pre-existing tuberculosis may be excluded, but that the originally healthy uterus may not have become primarily and the embryo secondarily infected. The presence of the bacilli in the embryo must be demonstrated at a period sufficiently early that placental transmission, from the uterine mucosa or some hidden focus in other organs, may be excluded,—hence, before any intimate connection exists between the mother and the fruit.

The third of these conditions, which must also be demonstrated on the lower animals, probably presents the greatest difficulties, for a large percentage of females will sooner or later develop genital tuberculosis from direct infection by the bacilli transmitted in the seminal fluid. Gärtner found that after cohabitation with males having tuberculous testes, 9 out of 59 female rabbits, and 5 out of 65 female guinea pigs developed genital tuberculosis, although they gave birth to non-tuberculous young. However, this condition must be satisfied before the paternal transmission question can be accurately answered, because it is held as highly improbable that an embryo that has been the host of living virulent tubercle bacilli from its beginning can go on to complete development and expulsion as a living, although diseased fruit. Since no comparison can be made between mammalian and avian tuberculosis, the experiments of Mafucci and Baumgarten with hen's eggs have no bearing upon the subject.

F. F. Friedmann publishes in the *Deutsche med. Wochenschrift*, Feb.

28, 1901, a preliminary report of experimental research on rabbits, which fulfils the second condition of the possibility of the paternal transmission; whether it satisfies the third condition or not, we cannot know until the full report has appeared. Instead of injecting tubercle bacilli into the testes, as did Gärtner, Friedmann used healthy males and females. Immediately after cohabitation, one or two drops of a suspension of virulent tubercle bacilli in a slightly alkaline, normal-salt solution were injected into the vagina of the female. Six days later before intimate connection between the uterus and embryo had taken place, the animal was killed, the uterus excised intact, hardened and imbedded in paraffine. Serial sections, stained by Ehrlich's method, were examined with high powers for the presence of tubercle bacilli.

In his preparations he was able to demonstrate tubercle bacilli 48 times in the embryo, most of them being intracellular, in the embryonal layers; he found several in the small space between the embryonal layers and the zona pellucida, made by the retraction of the former; many in the germinal vesicle; one single bacillus in the zona pellucida; two in the uterine cavity close to the embryo, and none in the uterus itself.

At variance with other investigators, he finds the maternal organs rarely, if ever, attacked, although the animal be allowed to go to full term.

Even if the third of the conditions is also satisfied, unless further investigations will show the seminal fluid of the tuberculous, with unaffected testes, to be more frequently infectious than has heretofore been demonstrated, heredity through the paternal ancestor must continue to play an insignificant role in the practical consideration of the etiology of tuberculosis.

X-RAYS IN TUBERCULOSIS.

It is unfortunately true that strangely absurd and palpably inaccurate statements will many times creep into the pages of our best journals, but it is not frequent that such an evidently meritless article as that entitled "Electro-Chemic Action of X-Rays in Tuberculosis" finds its way into the original columns of the ably edited New York

Medical Journal. Had not this article been given the recognition of a place among the original contributions of so reputable a journal, whose name alone gives a certain weight to its contents, we would not feel called upon to give it the additional recognition of mention here.

For obscurity of diction the paper is unique, but even that cannot hide its inaccuracies and disregard or ignorance of recognized methods and facts of experimental bacteriology. The presumption to advocate the establishing of institutions upon the plan advocated by the author for the treatment of tuberculosis, when he does not adduce a single cure to support his claims, is monumental.

The author tells us that the X-ray is "the latest and perhaps the most successful treatment" of lupus. The "latest," it is not, and statistics are not available which show it to be even probably the most successful. Surely the author does not consider Prof. Finsen's "Licht-Therapie" as in any way identical with the X-ray treatment.

The record of experimental work with sputum in veal bouillon contained in fish bladders, with pure cultures, etc., is so hopelessly mixed, that even the X-ray could not penetrate its denseness. However, this much is evident, tubercle bacilli cultures on acid media are said to have been destroyed by exposure to the X-ray. In the next paragraph the author tells us that a certain number of animals were inoculated from the "foregoing cultures" (exposed to and, in the case of acid tubercle cultures, killed by the X-rays); that the animals inoculated from the acid media were, after the 10th day ("when in the first stage of tuberculosis"), exposed daily to intense irradiation and that when these animals were killed two years later they showed that an actual cure of the tuberculous process had occurred. If we have followed the author, he cured a tuberculosis which he produced by inoculation with dead tubercle bacilli. If we have misinterpreted Dr. Rudis-Jicinsky we can only plead our inability to understand such combinations of words as this, "the apices and opposite upper lobe."

The doctor makes a few assertions that rather change the great epochs of medical history. Medicine must have been a backward child, for we are told that the "first great step in medicine" was the discovery of the

tubercle bacillus. Then we are further informed that the second step was the recognition of the fact that tuberculosis is a contagious disease; inasmuch as the contagiousness of tuberculosis was recognized before Koch was born and proved before he entered the university, the second step of this unpromising infant must have been a backward one.

Such articles are calculated to mislead the general practitioner, who, unfamiliar with bacteriological technique, may in his modesty, mistake the obscurity for deep scientific dissertation.

BOOKS RECEIVED.

TUBERCULOSIS AS A DISEASE OF THE MASSES, AND HOW TO COMBAT IT.—PRIZE ESSAY. By S. A. Knopf, M. D., New York. Octavo, 86 pages, illustrated. M. Firestack, 200 W. 96th Street, New York. 1901. Single copy, paper, 25c.; cloth, 50c.

PULMONARY CONSUMPTION, PNEUMONIA, AND ALLIED DISEASES OF THE LUNGS. Their Etiology, Pathology and Treatment, with a chapter on Physical Diagnosis. By Thomas I. Mays, A. M., M. D., Professor of Diseases of the Chest in the Philadelphia Polyclinic; Visiting Physician to the Rush Hospital for Consumption. Octavo, 539 pages, illustrated. E. B. Treat & Company, 241-243 W. 23rd Street, New York. Cloth. \$3.00.

LARYNGEAL PHTHISIS OR CONSUMPTION OF THE THROAT. By Richard Lake, F. R. C. S., Surgeon Laryngologist, North London Hospital for Consumption; Surgeon, Metropolitan Ear and Throat Hospital; Surgeon, Royal Ear Hospital; Surgeon for Diseases of the Throat and Ear, Trinity College of Music. Octavo, 74 pages; 36 illustrations, 21 colored. P. Blakiston's Son & Co., Philadelphia, 1901.

ELEVENTH REPORT OF THE STATE BOARD OF HEALTH OF THE STATE OF MAINE. For Two Years, ending December 31, 1899. Octavo, 319 pages, illustrated. Kennebec Journal Print, Augusta, 1900.

TUBERCULOSIS—INFECTION, HEREDITY, PREVENTION, HYGIENIC TREATMENT. By A. G. Young, M. D., Secretary of the State Board of Health of Maine. Octavo, 137 pages, illustrated. Kennebec Journal Print, Augusta, 1900.

SIXTEENTH ANNUAL REPORT OF THE BUREAU OF ANIMAL INDUSTRY. For the Year 1899. Government Printing Office, Washington, 1900.

THE INTERNATIONAL MEDICAL ANNUAL. A Year Book of Treatment and Practitioner's Index. Illustrated, 682 pages. E. B. Treat & Co., 241-243 W. 23rd Street, New York, 1901. Price \$3.00.

SELF-EXAMINATION FOR MEDICAL STUDENTS. 3,500 Questions on Medical Subjects arranged for Self Examination. With the proper references to standard works in which the correct replies will be found. With questions of the State Examining Boards of New York, Pennsylvania and Illinois. Third edition, enlarged—230 pages. P. Blakiston's Son & Co., 1012 Walnut Street, Philadelphia, 1901. Price, 10c.

SUPPLEMENT TO THE JOURNAL OF TUBERCULOSIS.

In this part the whole subject of Pulmonary Tuberculosis will be covered by a continued series of articles written by Dr. Karl von Ruck to appear in the following order :

Article I.—The Cause of Tuberculosis, and The Conditions Which Predispose to its Acquirement. Article II.—The Prevention of Tuberculosis. Article III.—The Pathology and Symptomatology of Pulmonary Tuberculosis. Article IV.—The Diagnosis of Pulmonary Tuberculosis. Article V.—The Prognosis of Pulmonary Tuberculosis. Article VI.—The Treatment of Tuberculosis, Dietetic, Hygienic and Symptomatic. Article VII.—The Climatic Treatment. Article VIII.—The Specific Treatment. Article IX.—Laryngeal Tuberculosis, its Diagnosis and Treatment. Article X.—Institutions for the Treatment of Pulmonary Tuberculosis.

THE HYGIENIC AND DIETETIC TREATMENT OF PULMONARY TUBERCULOSIS.

[CONTINUED FROM PAGE 104.]

Rest is also indicated by the increased cough which, unless otherwise explained, is due to physical overexertion. Such increase in cough is caused by local congestion in the diseased lung area and shows itself upon auscultation by increased moisture in the affected parts. This congestion is in most instances also attended by a slightly higher temperature, which in itself should lead to restriction of the previously permitted exercise.

When the expectoration becomes bloody, the permitted exercise must be greatly reduced or omitted entirely until the sputum has been free from admixture of blood for several days. Pulmonary haemorrhage will be of rare occurrence if exercise and rest are properly regulated until the patient can be discharged; its actual occurrence demands absolute rest in bed until the sputum has been free from bloody color for several days. The exercise must be renewed cautiously, and its increase should be slow and guarded for several weeks after the haemorrhage. Patients who have the opportunity of observing their temperature and pulse records and who are otherwise carefully instructed, soon learn to appreciate the benefit from rest, and from the avoidance of over-exertion, after which most of them act voluntarily in adopting a proper conduct as soon as they know what our directions would probably be. Under such management and with the intelligent aid that our patients can thus give, we are able to husband their nutrition and strength, there is better and more lasting increase in weight, the improvement is not

as often interrupted, complications are avoided and on the whole the prospect for recovery is greatly increased.

I am so impressed with the importance of constant supervision of the patient's rest and exercise, that I have felt it necessary to dwell upon this subject at length, knowing that many colleagues give but little or no attention to it and allow their patients to judge in this respect for themselves, without any other guidance than their own feelings and desires. I sincerely hope that those who have not heretofore realized the importance of such supervision, will give themselves the opportunity of becoming convinced of its great value, by making a painstaking trial.

THE OPEN AIR TREATMENT.

This method is rarely employed to the degree that its importance deserves, in many instances it is entirely neglected in the belief that it is only applicable at climatic resorts. For this reason the open air method and climatic treatment are usually held to be synonymous terms, and in a sense they are, because one of the benefits derived from climate, and probably the most important one, is due to out-of-door life, that is to say, to the patient's spending much of his time in the open air.

Of more recent years the belief in an immune or curative climate has gradually given way to a more rational explanation of the observed benefits derived in phthisis from sojourn at the various health stations. A climate is now considered valuable, in proportion as it allows an out-of-door life, and further in proportion as its atmosphere is free from infectious bacteria and the vitiating gases resulting from animal exhalation and from decay of organic matter. In addition we appreciate the advantage of air free from mechanical irritants, especially dust, and of relatively dry air; the benefits derived from diminished atmospheric pressure upon the circulation; and the effect of greater insolation upon the vegetative processes, which are attainable in elevated regions.

These advantages are, however, not *all* confined to certain localities and territories, and even in those most appreciated as resorts for phthisical patients, the existing conditions are such, that they are never present in an ideal degree and combination, or at all periods of the year to the same degree. Pure air is also found in other places, at least to a degree that answers all practical therapeutic purposes; the temperature conditions and sunshine, while less favorable or continued in some parts of our country, are nevertheless such that a certain amount of out-of-door life and the benefits of sunlight can be had almost any time, and in all localities during some seasons of the year, to as great an extent as is us-

ually taken advantage of by patients at climatic resorts. The despairing attitude toward effecting a recovery that not a few physicians assume, because a given patient has not sufficient means or is otherwise unable to journey to and live for prolonged periods at some climatic resort, is by no means justified, as will appear when the differences are fully considered and appreciated; for then it will be found that the disadvantages of an out-of-door life at home and especially in the open country, and of any one of these resorts as compared with any other, are by no means so great, as is at first supposed. Further, it will be seen that in many respects the disadvantage which exists can be more or less compensated in one way or another.

What we seek as a primary object is pure air; the air in the open, in preference to air enclosed in a room or dwelling; air in gentle motion to still air. Barring the crowded parts of tenement districts of large cities, and localities where dust and smoke become undesirable factors, any unbiased observer will be obliged to admit that such air is available to the great majority of phthisical patients in the localities where they happen to live, and likewise, that comparatively few of them take advantage of it to the extent that is possible without undue efforts.

An additional object is that the air shall be relatively dry, that is, it should be capable of taking up more moisture than it carries at its present temperature. Air is relatively the more damp, the nearer it approaches the degree of saturation, and at which it precipitates any excess of moisture. In this respect it must be admitted that a large part of our country presents less favorable conditions than are found in certain other regions, especially during the months of cloudy and rainy weather, but this difference interferes not so much with the patient's giving off moisture from the respiratory tract, especially in colder seasons, as it does with the respiratory function and of evaporation of moisture from the skin. In a measure we can compensate this disadvantage by the application of hydropathic measures to keep the skin in the very best possible functional activity, and by heating the air in the room, admitting it plentifully from the outside to prevent contamination from the exhalations of the occupants, and from other sources incidental to occupied dwellings. The actual disadvantage arises, therefore, more particularly, in that at such periods actual out-of-door life is restricted to pleasant days.

The existing temperatures in less favorable localities interfere with an out-of-door life only in so far as they reach a degree against which we cannot adequately protect the patient. Cold, in the absence of wind, is of no disadvantage. With proper clothing, and selection of shelter

against wind, with the patient well covered lying upon a cot, he can be out of doors at intervals during most days of winter, provided he is not already greatly emaciated or advanced in his disease to a serious or hopeless stage. Great heat is really more detrimental to the patient's interest than cold; but removal to the open country, proper dress, and rest in the open, in the shade of the house or of trees, will materially mitigate the discomfort and disadvantage of hot weather during the day, while open windows and the selection of a north-east room make the nights more comfortable. In most localities such measures will be sufficient to make removal to another climate unnecessary for the patient's improvement.

His advantages from sunshine are of course diminished in proportion to the cloudy and rainy days that obtain; in this respect, as also in respect to the benefits from diminished atmospheric pressure, and from increase of insolation at higher altitudes, the patient is at a disadvantage. This he must seek to compensate by taking advantage of every hour of sunshine that his locality affords, and indirectly, by otherwise complying to an ideal degree with all dietetic and hygienic necessities as are here set forth.

While by no means underestimating, much less depreciating, the advantages that are derivable under better climatic conditions than are observed during the less favorable seasons in the greater part of this country, and while fully cognizant of the benefits that arise from change of scene and environment, as well as from the patient's removal from the troubles of his business or family, it must be remembered that these advantages fully accrue only to those who being unable to afford the change without undue sacrifice and worry, actually take advantage of them in a proper way. To be convinced that this, as a rule, is not the case with most patients, as we find them in the hotels and boarding houses of the popular climatic resorts, one needs only to be there and to observe their conditions and conduct.

For the benefit of those who have not had the opportunity, I will only call attention to a class, who although desirous of gaining all possible benefits, are defeated by their supposed or actual necessity to live at the climatic resort as cheaply as possible. Having left a comfortable home with friends and relatives to minister to their wants, with good and nutritious food available and suitable to their needs, and with a faithful family physician in attendance at regular intervals, we find some of such patients domiciled in an indifferent boarding house; tucked away in a small, badly ventilated and indifferently heated room, with one or more flights of stairs to climb; subsisting on unsuitable diet, both as regards

quantity and quality; and otherwise without much chance of benefiting from the out-of-door life except when upon their feet walking in the street, or at best sitting in a straight chair upon the only available piazza, regardless of its exposure to sun, wind or dust; and often in uncongenial company.

The expense incurred in railway travel and the cost for board are such, that the patient does not wish to or cannot afford the regular professional care of a good physician, and thinks that the extra outlay for securing the advantages of climate is sufficient and justifies the expectation of a speedy cure. This is by no means an uncommon picture, neither an extreme one, and as a counterpart, we have the wealthy consumptive who comes with like great expectations and settles down in a fashionable hotel or boarding house. Expense being no material bar, he also employs a physician, and having done this, he hopes that the climate and the physician will do all the rest. If physically able and if he likes it, he has his horseback or carriage rides, he lives well from his standpoint, goes to clubs, theaters and takes in whatever source of amusement comes along. If up late at night he gets up late in the morning, and if so inclined he finds diversion in cards, pool or billiards, or in the lobbies and wine room of his hotel. Finding that his improvement is not as prompt or rapid as he expected, or suffering the penalty of a relapse from his indiscretions, he concludes that his physician is not giving him the proper remedies and treatment, and goes to another, or he decides that the climate does not suit his particular case.

I call attention to such efforts of saving expense on the one hand and to frivolous conduct on the other to show that many patients, although having the best climatic advantages do not, cannot, or will not, take advantage of its benefits as they should and that with more favorable conditions as to surroundings and food at home under the supervision of a conscientious and capable physician, the patient has not only an equal, but often a better chance in comparison, although his open air treatment may have to be carried out without the advantage of elevation and with less sunshine, in a more rigorous climate.

The particulars as to the method of carrying out the open-air treatment must be largely left to the physician to arrange for the individual case, taking into consideration the symptoms and stage of the disease as well as the time and season of the year, prevailing winds and weather, etc.

Many early stage patients can with advantage do light physical labor without fear of disadvantage therefrom and often with decided benefit,

so long as it is done in the open air and in not too inclement weather. If the personal hygiene, especially the care of the skin, is good, and proper precautions in footwear and clothing are observed, such patients need not necessarily be housed up because it rains or snows, or because it is cold.

The open-air method is of course to be adopted gradually, especially with patients who have not been accustomed to the out-of-door life, and if we have to begin it in periods of cold weather, we must guard against discomfort from chilling, and against the contracting of colds. By restricting the method to comparatively pleasant or bright days at first, even delicate patients can remain out for 10 or 15 minutes at a time, and usually much longer before they need to return to the house; and after warming they should resume their place out-of-doors upon a cot or reclining chair.

From an hour or two of such open air treatment, the time is further increased and less favorable days are also included until we attain our object more fully.

The chief precautions against discomfort or chilling are that the patient is sheltered from wind, that the piazza is on the sunny or protected side of the house, and that the lower extremities are well wrapped in a blanket or robe. A hot soap stone near the feet will add materially to the patient's comfort. While in the open air, talking and mouth breathing must be forbidden.

Physicians should not compromise with their patients by accepting walking or sitting on an ordinary chair out of doors in lieu of rest in a reclining posture in the open air. Few patients have the physical strength to exercise long enough to give the required time out of doors, and sitting in a straight chair is also tiresome, in neither case can the patient be adequately protected against cold weather. It is much better to start right with a cot and mattress, a few blankets and pillows and to vary the reclining position by allowing such exercise as is permissible to intervals. Even with moderate means a suitable shelter can be improvised on the protected or sunny side of the house, and if a better looking reclining chair cannot be afforded, a cot or couch is usually available, and if not it can be had for a small expense, by a contrivance, made of ordinary boards, which with a mattress upon it will answer every purpose.

It is my belief that very few patients pursue the open air treatment at climatic resorts in this manner, or obtain on an average more out-of-door life than can be secured at home, if both physician and patient

are in earnest to obtain it to the greatest possible degree. Systematic methods as above indicated are with rare exceptions confined to special institutions, and in those the results are satisfactory regardless of their location.

At the present time our views have greatly broadened, and our understanding of the requirements for a recovery from pulmonary phthisis is much more comprehensive than ever before, and while these include the best general and personal hygiene, the best diet, the most perfect management and conduct in regard to exercise, and rest, as well as the greatest amount of fresh, pure air, and sunshine, they also demand the most careful treatment of the general disease as well as of symptoms that become a hindrance to the favorable progress of the patient. If all else is right, some little necessary short-coming in one or the other of these essentials does not jeopardize the final result, and the difference that will accrue from climate alone will by no means be the saving clause in our efforts to cure this disease.

The truth of this statement will become the more apparent as the diagnosis is more frequently made in that period of the disease where destructive processes are not yet impending or have not already initiated the open stage of phthisis, with tubercle bacilli in evidence in the sputum. It will also manifest itself more distinctly when the home physician will have greater confidence in his ability to secure the desired result, than is now the case; because mistrusting the means at our command is almost synonymous with failure in their application, by leading to their indifferent employment.

THE DIET.

In the absence of fever or complications, especially those on the part of the digestive organs, a good many patients have sufficient appetite to eat all that is required for the maintenance of a satisfactory state of the general nutrition. If not required to expend an equivalent amount of force in physical and mental labor, there is, as a rule, an excess which more or less rapidly compensates the losses, that may have been sustained during periods of activity of the tuberculous process.

In this class of cases the general nutrition is therefore satisfactory, and in considering their diet, we can hardly be justified in interfering materially with that, under which this favorable state of nutrition is being maintained, but qualities of food should be guarded against from which we have reason to fear that the digestive organs may sooner or later become the seat of more or less serious derangement.

A good digestive apparatus being one of the cardinal requisites for the patient's general welfare and recovery, a careful scrutiny of what the patient eats is therefore essential, even with those who for the time show their nutritive processes to be in excess. A precaution which may save serious reverses at later periods, is to guard the patient against the abuse of his appetite from over-eating or eating unsuitable foods which by reason of difficult or impossible digestion are liable to give rise to attacks of acute indigestion and eventually to gastric catarrh.

In our efforts for the prevention of gastro-intestinal complications, we must, however, not only take cognizance of the foods which enter the digestive tract, but also regulate their quantity and quality in a manner that the digestive process can proceed with ease; we must further see to it, that no injury occurs from beverages, especially alcohol, and from drugs we prescribe ourselves. Insisting on reasonable quantities and nutritious quality, patients should never eat heartily when sensibly fatigued; a better plan is to give cup of bouillon, or a glass of milk and wait for the full meal until the fatigue has passed off. Regularity of time in eating should also be observed and sufficient time, five hours, as a rule, should be allowed between meals for digestion, when solid foods have been eaten in sufficient quantity. If to these precautions, we add the proper care of the mouth and teeth, and see that the bowels act regularly and sufficiently, we can expect that the integrity of the digestive tract will continue to aid us in the patient's recovery in a degree that can scarcely be over-estimated.

Control of the patient's weight is essential in all cases, and the weekly weighing gives the indication for increasing or changing the quantity and quality of the food.

Special measures in diet become necessary in another class of patients who, although free from fever and complications, are habitually small and capricious eaters, many of whom are under their normal weight when the first symptoms of disease make their appearance. Before concluding that their mal-nutrition is due to this cause, we must make reasonably sure, that the digestive organs are really in a condition to do their work, a question which in the absence of other symptoms may be best decided after a trial meal, and examination of the stomach contents, and upon further evidence that the functions of the bowels manifest themselves in a normal manner by regular daily evacuations. In such, the proper increase of their nutrition becomes at times quite difficult, but progress can usually be made by appeal to their understanding of the existing necessities. As the ingestion of insufficient food has

become a habit, we must try and cultivate a better one, which cannot always be done by a simple command, even if the patient is appreciative and willing to aid us. Frequently they complain of a sense of weight and fullness, flatulence, and rumbling, or of other discomfort, when they attempt to increase the accustomed quantity in an appreciable degree; our first attempts must, therefore, be guarded and limited, giving equal and perhaps more attention to substituting more concentrated and therefore more nutritious articles of food for such which are bulky with comparatively small food value.

Many times it is necessary to tempt this class of patients with a preponderance of such articles for which they have a special fondness, and of which they naturally eat more, a procedure which is perfectly proper, so long as the quality is not objectionable from its liability to cause indigestion. Intelligent and otherwise sensible patients, knowing the importance of what we ask of them, will soon succeed in augmenting the amount of food taken, and will be governed by our advice as to kind and quality as well; until they succeed as fully as we wish to have them, we have always a valuable resource in milk, and other liquid foods, by which we can supplement deficiencies not yet overcome.

When, however, the character of the patient is equally as capricious as the appetite, we may have an unenviable task; in some of these, nothing but actual fear will bring about the necessary compliance with our advice. The choice between cod-liver oil and a good sized beef-steak, or other suitable food in proper quantity, is sometimes quite effective, especially after a taste of the former has proved nauseating or disagreeable. I remember, however, a young woman, who appeared to prefer four ounces of the oil per day by the stomach, and nearly as much to be rubbed into the skin, and to be smelling like a fish at all times, rather than to eat sufficiently of proper food and fats.

The sovereign remedy, in any case is the enforcement of an out-of-door life, with the greatest amount of physical exercise consistent with the case. In a few instances its influence become apparent in the course of the first week. This failing in part or entirely, we have of course our recourse to bitter tonics, to small doses of arsenic or to orexin, which at times act exceptionally well.

The great importance of the nutrition of the patient is admitted on every side, and efforts have never been wanting in devising dietaries which should serve the purpose better than any other. The contradictory conclusions that grew out of these efforts have not always been

in harmony with practical experience, which has at all times pointed to the desirability of variation.

The nutritious quality has been kept as the prime object, the palatable preparation of the food, and consideration of the patient's relish have been and are still being insisted upon by all who actually have studied the subject in a broad and comprehensive sense, and in the light of results that are attainable in practice.

The exclusive meat diet had no other foundation for its proposition than the observations that carnivorous animals enjoy a relative degree of immunity from tuberculosis, whereas an exclusively vegetable diet had not even the advantage of theory for its proposition. On the other hand, the great advantage of combining all essential food constituents required by the organism in addition to comparative ease of digestion has led most naturally to the more or less exclusive employment of milk, on account of representing in fact a mixed diet, in which fats are well represented, the results have been better than from other exclusive methods.

Unless special indications exist by reason of fever or complications, more or less exclusive methods, while they have no advantage over a varied and mixed dietary, are often harmful in withholding from the organism certain other valuable food constituents, or at least a proper sufficiency thereof. In many cases the monotony becomes intolerant to the patient,—even with milk, the digestive organs are liable to rebel sooner or later.

Judging the improvement of a patient's nutrition by gain in weight, an exclusive meat or vegetable diet is more liable to be followed by loss than by increase, in fact, I do not now remember a single case, in my own practice with consumptives, that showed a marked gain, when meats and eggs alone were used as food. With milk, however, when the patient can take it in large quantity, of from four to six quarts a day, the gain in weight is often quite remarkable.

For many years past, I have carefully avoided every monotony in the dietary of my patients, and even when milk becomes the chief food, I take the greatest pains to vary at least its taste by occasional addition of small quantities of tea, coffee, cocoa, etc., and by alterations in its administration with other valuable, more or less liquid foods.

So long as we desire gain in weight, fats and carbo-hydrates must be in excess, but I see no cause for making the taking of them a source of discomfort or disgust, so long as I can accomplish my object in giving the food in a form which my patients eat with more or less relish.

If my patient will not take beef fats, but will eat plenty of butter, or takes enough milk and cream to adequately compensate for either, or if he is fond of the fat in the form of breakfast bacon and cold boiled ham, I have no quarrel with him, so long as he takes enough in an easily digestible form, and if he prefers four ounces of cod-liver oil per day, instead, he is still welcome to his choice. Aversions to fats are not uncommon experiences with phthisical patients, and I have seen not a few that took full doses of cod-liver oil in preference to cream and butter. A like position I believe to be proper with meats and vegetables, the only care we should have is, that the preparation of the food is good, and readily digestible. The insisting upon rare roast beef, and beef-steaks, with patients in whom the bloody appearance of the meat is obnoxious is too often practiced with a result that they eat but little, whereas they would eat heartily if the meats were served well done, and while preferable on account of easier digestion, rather than on account of increased nutrient value, it is by far better to not insist, but rather to let the patient eat his meat with a relish.

Fried articles of food should be avoided. The excessive use of sugar, especially in the form of sweet-meats, and candy is very liable to impair the appetite for other foods and to lead to stomach derangements.

Patients who eat heartily of nutritious foods should not eat between meals, unless they are actually hungry, when a cup of bouillon with a cracker, a glass of milk or some other simple and readily digested nutrient may be allowed in small quantity.

Some authors, especially Germans, recommend four or five meals a day, which is proper in so far as their meals differ from those accustomed to be served in this country. The German breakfast is not one of cereals, beefsteak, chops, eggs, potatoes, cakes, milk, bread and butter, etc.; on the contrary their three forenoon meals of early 7 o'clock breakfast, 9 o'clock breakfast and 11 o'clock lunch, consist of not more, but, as a rule of less, than the single American breakfast. The like is true with their afternoon and evening meals.

Frequent feeding has undoubted advantages in some instances and where indicated the quantity must be small, and the food of a light character capable of digestion in the intervals. If the patient's capacity for digestion is such, that an advantage accrues from such a method of feeding, we naturally adopt it, without calling a cup of cocoa, or a glass of milk with a cracker, a meal.

In the foregoing consideration of the diet, I have presumed the patient to be free from fever and from complications and

to be otherwise able to eat and properly digest his food. My purpose was to convey to my readers that with such, we should permit the greatest possible choice, which should be limited only with a view of gaining the object of increasing their nutrition, while we conserve a good digestive apparatus, capable of serving us well at future periods. Further, that special or exclusive methods of diet are not necessary in such a stage of the disease, and are liable to become obnoxious or otherwise harmful to our patient, and that the liberal use of fats and carbohydrates is essential to an increase of the patient's weight.

It remains now to consider the diet in the presence of fever, and of other complications.

THE DIET IN FEVER.

In the observant management of patients it becomes soon evident that slight elevations of temperature coincide frequently with digestion of food; that with difficult digestion, a temperature rise of one degree or more is often noted; and that this is the more likely to be the case when gastro-intestinal complications are already a feature of the case, or when hearty meals are taken, immediately preceding the advent of, or during the presence of fever, and also when the patient is sensibly fatigued.

For such who show elevations of temperature coinciding with digestion, it is a wise plan to moderate the quantity of food taken, or to change to more easily digested foods, and to supplement any deficiency by giving something to eat between the meals. The appetite is then not so keen at the regular meal, and the patient is less liable to exceed his power of digestion.

Some patients' appetites are but little or not at all influenced by a slightly elevated temperature. I have seen those who ate better and with more relish with a temperature between 99 degrees and 100 degrees F., than when the latter was normal or slightly below. In exceptional instances, patients having temperatures above 102 degrees eat solid food with relish and without apparent harm. Others lose their appetites with less than one or two degrees of elevation, and refuse all solid food, or make only an unsuccessful attempt at eating it. With such, as with all other patients who have fever, we must make those meals the principal ones, that coincide with freedom from fever, and most fever patients do this of their own accord. Such meals should be generous and nutritious in quantity and quality, whereas the meal or meals which correspond in time to the fever period of the day, should be light and of easy digestion. They usually require to be supple-

mented by liquid food. Should it appear that a more liberal meal taken before the fever has made its advent has also an adverse influence upon its subsequent degree and duration, a restricted special diet is necessary for that meal as well. The following lists are appended as suggestion of what in an average case with fever to 100 degrees F. will be found suitable and from which selections may be made as seems best for the particular case:

SOUPS: All thin soups and purees of peas, rice, potatoes, tomatoes, celery which may be reinforced by addition of tropon, meat juice or beef meal, providing the patient does not object to the taste.

CEREALS: Oatmeal, cracked wheat, hominy, mush (only if well borne), otherwise farina, granum and other breakfast foods, but especially those which in their process of manufacture have been super-heated like "wheat-hearts" and "grape-nuts."

BREADS: Light breads of wheat, whole wheat, graham, rye; if not well borne, toasted white bread or zwieback.

FISH: Raw or broiled oysters, clams, fresh fish of any kind broiled, baked or boiled. Of salt fish, only sardines for appetizers.

MEATS: Only stewed, roasted or boiled beef, mutton, poultry, game sweetbreads, breakfast bacon and tender cold boiled ham in limited quantity.

EGGS: Soft boiled, poached or raw.

VEGETABLES: Baked and mashed potatoes, baked sweet potatoes, raw and stewed tomatoes, rice, peas, string beans, cauliflower, spinach, asparagus, lettuce and tender celery, spaghetti and macaroni.

FRUITS AND DESSERTS: Oranges, grape fruit, melons, baked and stewed apples, grapes, peaches, strawberries, raspberries, blackberries. Special care is required with melons, peaches and berries that have been shipped from a distance. If they have been picked before ripe, have undergone changes of fermentation or have otherwise deteriorated before reaching the consumer they should be strictly avoided.

For desserts, stewed fruits, baked apples with cream, custards, light puddings are most suitable.

Patients who have more fever, or whose appetites fail greatly or entirely with a slight elevation of temperature, must still be induced to eat at regular meal hours, though the amount be small, if for no other purpose than to give a change from the more or less monotonous liquid diet which must be enforced during the fever period; they may select from the foregoing list, avoiding the coarser vegetables and substituting beef, chicken or calf's foot jellies for solid meats.

The chief diet during fever is, however, mostly liquid. A patient

can still drink when he loathes to swallow solid food. Fortunately, we have here a most valuable aid in fresh sweet milk, and if this agrees well, and can be taken in sufficient quantity, we need not fear about nourishing our patients, although they take little or none of the more hearty solid foods. With the addition of soups and broths, nourishing jellies, raw eggs, cocoa, and a variety of prepared foods, such as tropon and malted milk, bovine, beef juices, peptonoids, and by giving the milk in the form of koumiss, kefir, matsoon or even buttermilk, we can have quite a variety in the fever diet, although it may chiefly consist of milk, sometimes we can also induce a patient to take a raw beef sandwich with a little sour wine, or to eat a few raw oysters or clams.

At other times he eats with a relish a beefsteak or mutton chop when served unexpectedly for breakfast. Thirst being commonly experienced during the presence of fever, we can take advantage of it by adding to the water the white of egg with lemon and sugar and serving it as a lemonade. (1)

In giving milk one of the first requisites is that the patient's mouth is thoroughly cleansed each time after taking it; this precaution makes the continuance of its administration much easier, by preventing the bad taste from decomposition and fermentation of particles which are otherwise retained between folds of mucus membrane and between the teeth.

Even with nothing but milk, some variation is possible which aids greatly to a continued relish. We can give it cold, hot, and at times iced; next we can add a little coffee, tea or cocoa, then again an occasional glass of buttermilk or koumiss will relieve the monotony. If stimulants are indicated their administration with milk as a vehicle, in egg nog, milk punch or milk shake must also be thought of.

Often we can give a graham wafer, a cracker or a little zwieback with the milk which as additions to the total amount of food, however small, must not be despised, while they serve the useful purpose of preventing the formation of large casein curds in the stomach.

If the administration of milk is thus varied daily and from one time to another, according to the patient's preferences, if occasionally a little broth, jelly, a nourishing soup, a raw beef sandwich, etc., as heretofore suggested, is made to intervene, there will be very few patients

(1) Take the whites of 4 eggs and shake up with $1\frac{1}{2}$ pints of water in a quart bottle, after shaking until the albumen is all dissolved in the water, strain through a coarse cloth, add sugar and lemon or orange juice and put on ice. This is a grateful drink in fever, and all patients like it.

to whom we cannot give it in sufficient quantities, for months, if necessary.

If milk forms the only article of diet, an adult weighing in the neighborhood of 120 pounds requires four quarts in 24 hours; it should be rather eaten than drunk, at any rate let the patient consume 5 minutes or more in taking an ordinary glass full, instead of drinking it down at one time.

If milk is not well borne by the stomach, if it causes distress by flatulence, sour stomach or a sense of fullness, we may still try to continue it by adding lime water or by peptonizing it.

It is not always best to simply take a patient's statement that milk does not agree, and unless the related or actually observed experience is convincing, we cannot afford to give up so valuable an article of diet in the treatment of phthisis. I have had many patients who protested that milk made them sick and caused nausea, that it made them bilious or otherwise disagreed, and who eventually took it in liberal quantities to their own astonishment. One patient in particular absolutely refused it, saying it gave her hives, and made her otherwise sick. It seemed that anything else that I proposed to her as a substitute, was objectionable for one reason or another, and I resolved upon insisting on a trial with milk in spite of her protests. She admitted that she could take a little in tea or coffee, and figuring up the little amounts to several ounces per day, this amount she consented to take clear. I began therefore with a table-spoonful every three hours and the amount appearing ridiculously small to her also, she herself increased it to about one-third of a glass full each time. Carefully keeping the bowels open and insisting upon cleansing the mouth after taking it, and with the variations heretofore stated, this patient eventually took three quarts a day for as long as it was needful without the occurrence of hives or any other discomfort.

Biliousness means, as a rule, constipation; but if but little solid food, and no vegetables enter into the diet, we must expect the bowels to become sluggish or constipated, especially with fever-patients and in the absence of physical exercise.

When such a tendency becomes manifest, we must remedy it, and by whatever means we find best, the bowels must be moved sufficiently every day. Sometimes the simple addition of Seltzer, to a few glasses of milk during the day has the desired result, at others we may succeed best with enemas, occasional mild aperients, and at times a more active laxative is necessary; but I say again that, by keeping the mouth

clean and the bowels open, there is not one patient in several hundred, who cannot take at least a moderate amount of milk, in one form or another, provided the digestive organs are not the seat of actual disease.

With fever that does not exceed 101 degrees F., we can, as a rule, nourish patients sufficiently to prevent loss of weight; exceptionally I have seen steady and marked gain with even higher temperatures that continued for weeks or months. With temperatures above 102, most patients lose weight in spite of the best and most judicious feeding, while with slight febrile elevation, not exceeding 100 degrees F., and lasting for only a short period of the day, gain in weight should be the rule.

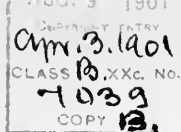
The foregoing general directions I believe are sufficient to govern a painstaking physician in the management of the diet of fever patients, and all that I may, perhaps add is, that cod-liver oil is contra-indicated in hectic fever as well as in the continued forms. With anxious and easily discouraged patients, too frequent weighing had better be avoided, they should be encouraged to have patience and should receive assurances, that others have had to pass through like periods of fever, and have thereafter had no difficulty to regain the loss, and that in the end some of them exceeded their normal weight. With others the loss of a few pounds of weight is a strong argument for compliance with our directions for increasing the nourishment when this is otherwise feasible.

The diet in anorexia of nervous origin, should here also have mention, if for no other purpose than to say that if success is to be attained in the treatment of the tubercular disease, these patients must be fed in one way or other, and if necessary, it must be done with the stomach tube.

Having failed by simply washing of the stomach with a 2 per cent. salt solution, and an out of door change of scene and environment, as well as the administration of bitter tonics, arsenic and orexin, having proved unavailing, there is nothing left than to adopt forced feeding.

In several such cases in which the digestive power of the stomach appeared unimpaired, I was gratified to see a return of a normal appetite after feeding through the tube had been resorted to for only a few days, in others it took weeks or months, but in every case, material benefit was obtained, excepting a few that passed from under my observation before a natural appetite returned in the course of time.

[TO BE CONTINUED]



THE JOURNAL OF TUBERCULOSIS.

A Quarterly Magazine Devoted to the Prevention and Treatment of Tuberculosis.

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ORIGINAL CONTRIBUTIONS.

TUBERCULOSIS OF THE UPPER AIR PASSAGES.*

BY PROF. ALBERT ROSENBERG, BERLIN.

Although we know that the essential cause of lupus, as well as of tuberculosis, is the bacillus of Koch, we are accustomed to make a distinction between the two diseases when they attack a mucous membrane; because in their course and in their clinical manifestations they generally present characteristic differences which justify such a distinction. Therefore, we speak of pharyngeal and of laryngeal tuberculosis, and of pharyngeal and of laryngeal lupus, since we consider the latter of less ominous significance. If, in regard to the nasal mucosa, this distinction has not been brought to an issue, it is due to the fact that the clinical pictures of these two affections of the mucous membrane of the nose have not yet been sharply defined from each other; this is because heretofore a too small number of cases has been observed by the rhinologist and because the dermatologist, into whose hands these cases most frequently come, has taken too little notice of the nasal mucosa; also because here, as in the remaining respiratory mucosa, transition forms appear.

Until, therefore, the distinction between the two diseases rests upon a more certain basis than at present, I shall not, in reference to the nose, undertake to differentiate between them, but will speak in general of—

TUBERCULOSIS OF THE NASAL MUCOSA. It is certainly undeniable that this affection occurs preponderately in those hereditarily predisposed, and in persons affected with tuberculosis of other organs, especially of the lung; though it may not infrequently be necessary to presuppose a latent tuberculosis according to Baumgarten's idea, i. e., the tuberculosis is very often to be traced back to an infection through the blood or lymph. On the other hand, it should not be forgotten that a phthisical subject, if, for example, he expectorate into a handkerchief and afterwards uses the

* Translated from the manuscript by Dr. S. H. von Ruck.

same to clean his nose, can cause an auto-infection of the nasal mucosa. In like manner the surroundings of a tubercular patient are exposed to infection; for instance, Scheck saw a woman who became infected by using her tubercular husband's handkerchief which was soiled with sputum. Again it has occasionally been observed that lupus of the nose has been transmitted from mother to daughter, or *vice versa*, from the use of the same towel. I have no doubt that the infection results from a soiled finger more often than has hitherto been assumed. The localization of the disease at the fore part of the septum argues in favor of this, as well as in favor of the last mentioned possibilities. In contrast to this "contact infection" the air infection is indeed comparatively infrequent. This may truly be wondered at, if we share the opinion of Koch and of others that tubercular infection of the human organism is brought about chiefly by way of the respiration; and if we further believe that that place which forms the port of entry for the tubercle bacillus is also always affected with tuberculosis, the nasal mucous membrane over which the current of air, under normal conditions, first passes, would truly be most exposed to the danger of infection. But it should not be forgotten that the nose possesses a number of protective means against this; the infiltration of the inhaled air, the ciliary movement, the bactericidal nasal mucus, the intentional cleansing of the nose, sneezing, etc. For this reason an air infection of the nasal mucosa will occur only, when from some general or local cause its power of resistance has been diminished (severe constitutional disturbances, catarrh, etc.), or when a wound of the same has previously occurred. That the first stages of tuberculosis of the nasal mucous membrane have been observed comparatively rarely is to be explained by the fact that the disease at first causes no severe disturbance; and that consequently the patient consults the physician only when the process has already attacked the external nose. A critical examination of the literature on this subject leaves no doubt that a large percentage of the cases of lupus of the cutaneous nose originate in the disease of the mucous membrane. Cazanave, and later Wernher, called attention to this more than 50 years ago. Such patients consult the dermatologist, who takes the nasal mucous membrane but little into consideration, and who, at this stage, is often no longer able to determine the primary seat of the disease. The forms in which tuberculosis of the nasal mucosa may occur are: 1st, *nodules, granulations*; 2nd, *infiltrations*; 3rd, *ulcer*; 4th, *tumor, tubercles*.

1st. *Granulations*. These are grayish red nodules which, as a

rule, occur at the anterior part of the septum. In patients suffering from "catarrh and eczema of the nares" one must never neglect to cleanse the crust covered portion of the vestibulum, because these crusts may conceal the actual seat of the disease. After their removal a granulating inflammation of the mucous membrane of the septum is not infrequently seen. Later, disintegration renders the disease recognizable.

2nd. *Infiltrations* are characterized by a more diffuse, relatively thick, pale red swelling of the nodular appearing mucosa of the septum or of the turbinates.

3rd. *The ulcer*, which frequently develops on the site of an infiltration or from a granulation, usually appears first on the anterior part of the septum; it is solitary, varies in size from that of a lentil to that of a bean, presents a nearly round, often irregular, margin and a grayish red, nodular base, and is covered generally with muco-purulent, more rarely with cheesy masses. Often remains of granulations may be seen at the base. In other cases, and this is considered as characteristic of tuberculosis, the edge is infiltrated and gnawed out. At the sides yellowish white miliary nodules may be seen shining through; these break down with the production of new ulcers which by confluence with the first form a more and more sinu-
dries readily to a scab;

it seldom occurs.

Although the tubercular ulcer, in contradistinction to the syphilitic, has a tendency, usually, to spread over the surface rather than to attack the deeper structures, it occasionally involves the perichondrium (or the periosteum) and then progresses to the cartilage (or bone); so that it not only produces a perforation of the septum, but may also lead to extensive destruction of the same. Yet after all that has been said above, the ulcer is so characteristic that it can be confounded only with syphilis. Should any doubt exist the trial injection of tuberculin, on the one hand, and the ineffective use of iodide of potassium, on the other, will make matters clear; the microscopical examination of a piece of the tissue taken from the floor or from the close vicinity of the ulcer will serve to confirm the diagnosis.

4th. *The tuberculous tumor* is situated, in the beginning, also at the anterior part of the septal mucous membrane; but may subsequently extend to the floor and lateral walls of the nose. In size it varies from that of a lentil to that of a walnut; it is reddish, nodular, soft, usually broad based and bleeds readily when touched. In its neighborhood miliary tubercles

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ERRATUM :—In line 20 of page 210 for "infiltration" read "filtration."

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are sometimes seen. Often at the base it involves deeper structures; so that after its removal a perforation becomes evident. Its tendency to disintegration, its nodular surface, its softness and its location distinguish it sufficiently from other tumors which may come into consideration. Syphilis almost never forms such large tumors, and attacks with predilection the bony septum. In doubtful cases potassium iodide determines the diagnosis.

If the general condition of the patient affords no contraindication to an energetic surgical curettage, this is, naturally, the only rational treatment. Then there come into consideration the galvano-cautery, the thermo-cautery, escharotics and eventually tuberculin.

TUBERCULOSIS OF THE NASO-PHARYNX. That the naso-pharynx can also be the seat of tubercular disease Gerber has demonstrated in a very interesting case in which on the naso-pharyngeal roof a great many miliary tubercles were to be seen; and in which the disease had advanced to necrosis of the edge of the vomer. The fact that the naso-pharynx is so rarely examined is certainly the reason that a tuberculosis of this region is spoken of as a curiosity; although it cannot be denied that it is uncommon. Nevertheless that this region deserves the most minute attention is shown by the researches of Freudenthal. According to him, in fifty-two cases of phthisis tubercle bacilli were found twenty-four times in the secretion of the naso-pharynx; seventeen patients showed even ulcerations. From the examination of eighty-one non-tubercular patients among whom he found tubercle bacilli nine times and ulcerations once he concludes that the naso-pharynx is sometimes to be considered as the site of primary infection. Retro-nasal catarrh, which is so frequently present, may deprive the mucous membrane of an important defence against infection inasmuch as the destruction of the ciliated epithelium favors the lodgement and development of tubercle bacilli. Finally it is not to be overlooked that in the hyperplastic pharyngeal tonsil tubercle bacilli and other histological signs of tuberculosis are more often found than is generally supposed. The forms in which tuberculosis of the naso-pharynx occurs are *ulceration*, *tumor formation*, which has been described by several authors, and *tuberculosis of the pharyngeal tonsil*.

Primary lupus of the naso-pharynx, which is indeed exceedingly rare, manifests itself as pale reddish nodules. More commonly lupus of this region occurs secondarily to lupus of the nose.

TUBERCULOSIS OF THE PHARYNX. More frequently, although it

is comparatively rare, we find tuberculosis of the pharynx. The disease affects mostly the male sex and occurs generally in youth or young manhood. It is, as a rule, secondary; but may be primary, in which case it is usually due to tuberculosis from feeding, as has recently been shown by Friedmann. In this case the port of entry is the faucial tonsil. According to my observation pharyngeal tuberculosis has occurred relatively often among the young country folk; thus one is reminded of the use of milk from cattle affected with pearl disease, or of the prevailing uncleanness in the country. Infection due to inhalation is especially probable among mouth-breathers. The complaints of the patient are proportional to the extent of the disease, and depend upon its location. Whenever the velum is involved the painful sensations, due to stretching of the diseased mucous membrane by the movements of the underlying muscles are more severe than if, for instance, the tonsils alone are affected. The throat symptoms vary in degree from simple dryness and the sensation as of the presence of a foreign body to slight burning, lesser or greater or even unbearable pains which frequently radiate towards the ear of the diseased side. In the latter case the velum palati is scarcely, if at all, raised and consequently the food, especially fluid, enters the post-nasal space, whence it comes out through the nose. Then fetor from the mouth is present and often swelling of the cervical and submaxillary glands. Shining through the reddened, swollen mucous membrane may be seen red tubercles which vary in size from that of a pin point to that of a pin head; these speedily undergo ulcerative disintegration. Less frequently than this miliary form, but often associated with it, is observed diffuse infiltration which lends to the mucosa a more gelatinous appearance. The ulcers are mostly superficial, have a bacon-like base, gnawed out edges and a reddened circumference in which, or in the neighborhood of which, may be seen tubercles still remaining. This appearance is so characteristic of tuberculosis that it can scarcely be confounded with other diseases. Perhaps syphilis may come into question in the differential diagnosis; but the plaques are of a more whitish color; the tertiary ulcerations extend much farther into the deeper tissues, present sharply defined edges, heal under potassium iodide with the formation of shriveled scars, and do not have in their vicinity the small tubercles. Although a number of cases of pharyngeal tuberculosis have been cured, still the majority soon succumb to exhaustion. Again the prognosis may be clouded by the extension of the process to other parts.

The treatment is essentially the same as for nasal and for laryngeal tuberculosis, to the discussion of which we will return later. As regards prophylaxis, the probability of an infection through the tonsils should be taken into consideration; and if these are hypertrophied a tonsilotomy should be advised. For the same reason, not to mention other considerations, adenoid vegetations should always be removed.

LUPUS OF THE PHARYNX, which in the female occurs more often than tuberculosis of the pharynx, furthermore, more frequently during the period of growth and development, is a consequence of lupus of the skin, or of the nasal mucosa. It may be primary, in which case it localizes itself with predilection upon the velum and the uvula, involving first the mucous membrane and only with the later disintegration extending into the deeper tissues. The appearance of the diseased mucosa is decidedly different from that of tuberculosis. The mucous membrane is of a pale or more often of a bright red color, somewhat swollen, drier, and appears as if filled with granulations. The nodules, which may attain the size of a pea, are round, smooth and pale red. From the occurrence of interstitial atrophy with scar formation, which is not unusual, the appearance becomes all the more characteristic. At other times the infiltration undergoes ulcerative destruction after caseation has taken place. These lupus ulcerations are more circumvallate and present a base covered with torpid granulations; they are not surrounded by tubercles such as are usually seen in tuberculosis. This appearance of the lupus nodules as well as of the lupus ulcerations, their slow development, the coexistence of the two forms with cicatrization, and their painlessness, sufficiently distinguish lupus from syphilis, as well as from tuberculosis. Moreover, syphilis heals under anti-specific treatment, while lupus is not influenced thereby. To be sure, there are transition forms which may render the diagnosis difficult. As compared with tuberculosis the prognosis (of lupus) is relatively favorable.

Of all the organs of the upper respiratory tract the larynx is most frequently attacked by tuberculosis. For this reason tuberculosis of the larynx deserves more particular description, not only because this disease presents a new phase—perichondritis,—but because it may lead to severe impairment of the voice and under certain conditions of the breathing also.

If in the preceding paragraphs there is much that I have treated of incompletely or inexactly; in the following more will be mentioned

which, *mutatis mutandis* can and should apply to the disease of the nose and of the pharynx, especially in so far as diagnosis and treatment are concerned.

TUBERCULOSIS OF THE LARYNX. Just as there is a primary tuberculosis of the nose and of the pharynx, so we may quite correctly speak of primary laryngeal tuberculosis. *A priori* in the individual case certain objections to such a conclusion may be made; for example, that with our methods of physical examination we can not always establish with certainty the presence of a pulmonary tuberculosis which may have secondarily infected the larynx. However, if we take into consideration that the fact must be accepted that a suspected pulmonary phthisis must in its subsequent course manifest itself, which, at least up to a certain time, it does not do, that also at the autopsy, sometimes in a case of far advanced laryngeal tuberculosis we are able to pronounce the lung disease as comparatively incipient; and finally that, *post mortem*, tubercular deposits have been found in the larynx without pulmonary involvement (in few cases to be sure) there remains no doubt that, although rarely, a primary tuberculosis of the larynx does occur.

The mode of infection is naturally that of an inspiration tuberculosis; at times that of a tuberculosis from feeding. That also a lymphogenous origin is not to be disregarded, would seem quite certain from the observations of Klebs. He believes that the first beginning of laryngeal tuberculosis is accompanied by swellings of the lymphatic glands of the neck; that these swellings not infrequently precede changes in the interior of the larynx which are recognizable with the laryngoscope; and that thence the infection is conveyed to the respiratory mucous membrane. The cervical lymph glands in their turn are infected by a tubercle bacillus invasion of the adenoid tissue of the pharynx. Opinions are divided as to whether for an invasion of the laryngeal mucous membrane by tubercle bacilli it is necessary that the epithelium should have been lost, or whether the bacilli can penetrate the intact epithelium. That the latter may be the case the researches of Heryng and of E. Fraenkel have proven. The chances for this are naturally greater if defects in the epithelium are present as happens occasionally in an intense catarrh. Still more favorable for an infection of the laryngeal mucosa are those conditions in which ulcerations of a nature other than tubercular exist. Then the tubercle bacilli present in the air can, of course, penetrate the mucous membrane the more easily. In a case which personally I ob-

served, the patient, who had previously been thoroughly sound and vigorous, had acquired syphilis. Besides other specific manifestations he had a syphilitic ulcer of the larynx; under mercurial treatment all these disappeared with the exception of the ulcer, which soon changed its character and became metamorphosed into a tubercular ulcer. From the latter the lungs were infected and the patient died of a combined laryngeal and pulmonary tuberculosis. Upon the whole, it appears to me that frequently relapsing syphilis, which weakens the organism just as other consuming diseases reduce the resisting power of the body, renders the latter more susceptible to tubercular infection, even in cases of individuals not hereditarily predisposed. In secondary laryngeal tuberculosis infection occurs almost always from the lungs; certainly from the sputum or by way of the blood or lymph; it is seldom secondary to tuberculosis of other organs. If one side of the larynx, for example one vocal cord is tubercular, the other cord may become infected by contact. Tuberculosis of the larynx attacks the male more than the female in the ratio of three to one; while in respect to age the disease occurs most frequently about the thirtieth year; children and the aged are very seldom affected. Usually distinct symptoms of tuberculosis of other organs, especially of the lung, precede laryngeal tuberculosis; particularly in young girls signs of anaemia and dyspepsia. At first the voice tires easily and, if a pronounced laryngeal tuberculosis has already developed, as the most common symptom occurs hoarseness in all degrees from slight dysphonia to to complete aphonia. The hoarseness depends upon defective closure of the rima glottidis, due to mechanical hindrance from changes in contour of the vocal cords, from tumors, from thickening of the posterior wall, from paresis of the muscles, or from infiltration or ulceration of the cords. Of course, hoarseness may be absent if only the entrance of the larynx is involved. Nearly always cough is present which, as a rule, is induced by the pulmonary tuberculosis, although sometimes its distressing character prevails on account of the laryngeal affection. That, in many cases, the cough is due to the laryngeal disease I have been able to convince myself from the use of anaesthetic intralaryngeal injections, which have relieved it to a marked degree.

If, as is usually the case, there is expectoration it contains tubercle bacilli; such blood as is present in it comes generally from the lungs, though it may be from ulcerations of the larynx. Sweats and fever are of a hectic nature. Dysphagia is a comparatively frequent symptom, the existence of which depends essentially upon the location and degree of the disease. Painful swallowing occurs especially with perichondritis of

the arytenoid cartilages and with ulcerations of the entrance of the larynx, i. e., of the aryteno-epiglottidean folds which every bolus must pass. The pains may become so intense that the patient refuses to take food. Generally they are less severe in disease of the interior of the larynx. Often they radiate from the throat to the ear corresponding to the diseased side. With infiltrations of the entrance of the larynx it not infrequently happens that particles of food, especially fluids, gain access to the larynx and so cause severe coughing; this occurs as a result of incomplete closure of the superior aperture due to defective mobility of the epiglottis and of the aryteno-epiglottidean folds. Finally dyspnoea may occur if the lumen of the larynx is narrowed; this is caused by oedematous swellings about the superior aperture, by perichondritis of the arytenoid cartilages, particularly if on account of an ankylosis of the arytenoid joints the vocal cords remain fixed near the middle line; it is further caused by tumors, extensive granulation formation and subchordal swelling, etc. The laryngoscopic picture may be an exceedingly varied one. In general, four forms are to be distinguished which, of course, may coexist; these are *infiltration*, under which a sub-division of miliary tuberculosis might be inserted, *ulcerations*, *perichondritis* and *tumors*.

Infiltrations may occur in all parts of the larynx. The epiglottis is converted into a thick, inflexible, almost or quite immovable, partly red, partly pale, oedematous tumor through the epithelium of which grayish nodules may sometimes be seen shining; the latter vary in size from that of a pin point to that of a pin head. With this is often associated infiltration of one or of both aryteno-epiglottidean folds, which then present a sausage-like form and have usually an oedematous appearance. The arytenoid cartilages are usually considerably swollen and ring shaped; and the false cords become converted into roundish, red or pale, rough masses which may partially or entirely conceal the underlying vocal cords. From the ventricle red, granulatory masses may be seen projecting. If the true cords are affected they show a more circumscribed or a diffuse red thickening, at first more nodular in form, which if the involvement is complete they take on a cylindrical instead of their original prismatic form. In the inter-arytenoid region the infiltration projects either in the middle or more to one side in the shape of a cone or of a half cone which may be red or pale; or there may be a number of small round elevations situated closely together. The subglottic mucous membrane may be so swollen from infiltration as to project from underneath and beyond the margin of the vocal cord as a red tumor, which posteriorly

becomes broader; this tumor occasionally involves also the posterior wall.

The *miliary form* of infiltration is seen, generally, in miliary tuberculosis; yet sometimes small gray or yellowish nodules may be seen situated upon the edge of an ulcer. As a rule after a short time the infiltration partially breaks down, giving rise to an ulcer by the side of which part of the infiltration still remains. This is frequently the case with ulcers of the epiglottis, which, by the way, occur more often on the laryngeal surface than on the margin or on the lingual surface. These ulcerations are often, especially when they involve the deeper structures, almost entirely covered with granulations. Besides these deeply extending ulcerations which attack the mucous membrane covered with columnar epithelium occur also flat, so called, lenticular ulcers which are said to attack, more commonly, regions covered with pavement epithelium. These are more often seen on the aryteno-epiglottidean folds where they become covered with a muco-purulent secretion, after the removal of which granulations are frequently seen on the floor of the ulcer.

The arytenoid cartilages most rarely undergo *ulceration*. On the false cords multiple ulcerations sometimes appear, so that several holes of the size of a pin head occur in proximity to one another; or there may appear ulcers with irregular edges and covered with viscid secretion. In the inter-arytenoid region the infiltration breaks down and appears fissured and torn; or in the middle of the infiltration area a deep crater-like ulcer forms, which is completely surrounded by the peripheral infiltration; so that by means of the ordinary method of laryngeal examination one is able to see only the ragged projections of the upper part of the same which obscure the ulcer proper and interfere with the view. According to Zurasz the formation of an ulcer on the vocal cords is ushered in by a whitish gray, circumscribed, round or elongated discoloration, due to cloudiness or extensive epithelial proliferation, which is sharply differentiated from the otherwise red color of the cords. These discolorations are often situated symmetrically upon the edge or upon the upper surface. There may be several small ulcerations separated from one another by infiltration or by granulations; or the whole length of the vocal cord may be involved; at the same time the ulceration has also a serpentine form (M. Schmidt), i. e., it extends from below and posteriorly to above and anteriorly around the thickened edges. Masses of granulations protruding beyond the edge of the vocal cord prove the presence of granulations underneath the same. The hypoglottidean mucous membrane may disintegrate throughout its whole extent so that

an annular ulceration is formed below the cords. If an ulcer occurs on the processus vocalis it usually gives rise to a pit-like defect in the mucosa surrounded by a wall; the pit corresponds to the processus.

Since the vocal process is covered by only a thin layer of sub-mucosa the ulcer soon involves the perichondrium; and, as the disease approaches the arytenoids a *perichondritis* of these cartilages, in such cases, readily occurs. On this account perichondrial inflammation of the arytenoids is most common in tuberculosis; also because deep ulcerations of the posterior wall may involve these cartilages. The mucous membrane swells considerably, just as in the infiltrations, and the necrosed cartilage is then expelled. The ulceration of the interarytenoid region may progress gradually downward and cause a perichondritis of the plate of the cricoid whereby a portion of this cartilage may also be thrown off. In case of spontaneous opening of the perichondrial abscess with outflow of pus there is, especially in sleep, a certain danger of suffocation; then also from collapse of the cartilaginous framework a stenosis may originate; and finally through elimination of the plate of the cricoid cartilage the muscoli crico-arytenoidei postici, the openers of the glottis, lose their points of attachment; so that the vocal cords approach each other and asphyxia occurs. Perichondritis of the thyroid cartilage is rare, but when it does occur results most readily from a previous ulceration of the anterior commissure.

The *tubercular tumor* may exist as the only manifestation of tuberculosis, or it may be associated with the other forms which have been enumerated; it may occur primarily as well as secondarily. It is situated, preferably, in the sinus Morganii, on the posterior wall or at the anterior commissure. Its size varies from that of a lentil to that of a cherry; and it is usually round, seldom lobed, often rough and in color varies from a dingy white to rose. It grows slowly and represents a conglomeration of tubercles. If the changes which have been mentioned are present in pronounced degree the diagnosis is not difficult, especially if the lungs are involved. But in certain cases difficulties present themselves; particularly may it be confounded with syphilis, or with simple catarrhal pachydermia, especially if the swelling is fissured. The assumption of syphilitic disease will be avoided by the ineffective use of iodide of potassium and mercury. A more exact inspection of the posterior wall by Killian's method and the microscopical examination of removed particles render the diagnosis certain. In all cases a thorough examination of the whole patient, in reference to the existence of a tuberculosis of other organs, especially of the lungs, should be undertaken. Other signs of

syphilis also are to be noted. Although syphilis and tuberculosis may co-exist the presence of scars in the pharynx and larynx renders the diagnosis of syphilis more probable. An ulcer on the vocal process may be mistaken for a completely surrounded depression which may occur at this point in pachydermia laryngis. But on closer inspection one sees that this depression is covered with epithelium, and that on the processus vocalis of the other side a corresponding tumor is present which during phonation fits itself into the depression. As a rule the tubercular ulcerations present a less sharp margin than the syphilitic; they are more ragged and gnawed out and show often at base and edge, miliary tubercles. The secretion, removed from the base of the ulcer by means of a brush or forceps, shows, under the microscope, although often only after repeated trials, the presence of tubercle bacilli. A tubercular tumor proves, by microscopic examination, unmistakably to be such. This many times removes the doubt as to carcinoma, which occurs occasionally in the form of a diffuse infiltration of a vocal cord. Moreover, the unilateral occurrence of such a tumor is always suggestive of tuberculosis. Lupus is distinguishable from tuberculosis by the fact that in the former the tubercles are larger, are covered usually with a less glistening, drier epithelium, persist longer and break down more slowly than the latter; and by the fact that often the three stages of infiltration, ulceration and cicatrization are present simultaneously.

The prognosis depends upon the state of the lungs, the general condition of the patient and the extent and seat of the disease in the larynx. The further advanced the pulmonary process is, the more unfavorable in general is the prognosis. Hereditarily predisposed patients have, as a rule, not as good chances as those of healthy families. The prospects are worse when the entrance of the larynx is involved; and naturally when there is extensive disease of the laryngeal mucosa. More than once I observed that laryngeal tuberculosis, even in advanced stages, can heal spontaneously under favorable hygienic and climatic conditions, especially if the state of the lungs is a relatively good one. The prospects from therapeutic measures, regardless of the above mentioned conditions, are the better the sooner the patient presents himself for treatment. Although up to the present time the number of cases of definitely healed laryngeal phthisis is a comparatively small one, and although in those apparently cured relapses very often occur, still we can protect such patients from suffocation, remove the dysphagia or greatly relieve it, and thereby induce better nutrition with its important consequences.

The treatment is both general and local. Under general treatment

are included all those hygienic and dietetic measures which we consider in the therapy of pulmonary phthisis; consequently I need not here discuss them in detail. As concerns the choice of a health resort, such a one should be selected as exhibits a certain humidity and is free from dust. In this respect prolonged ocean trips, which fulfill both these requirements, are of great value.

It would seem that formerly a proper conception as regards the altitude of the resort has not been had. Too highly elevated localities were chosen; for instance, Denver, Colorado Springs, etc. Nevertheless from both these places favorable reports of the course of laryngeal tuberculosis had been made. Still, while visiting Leysin, 1450 metres above sea level, I was able to convince myself that the widely accepted view in regard to high altitudes is a prejudicial one. On the whole, the patients are best provided for in a sanitarium, situated in a favorable climate, where a resident physician is conversant with the methods of local treatment of laryngeal tuberculosis. The constant supervision, the facilities for local treatment convenient for the patient, a proper nutritious diet, the prolonged sojourn in a fresh, pure, sunny atmosphere free from dust are all of very great importance—conditions which are seldom elsewhere to be found associated. Of course debilitated patients with high fever are best kept at home. Injections of tuberculin, on account of their uncontrollable danger, have been abandoned by most authors. The internal remedies *par excellence* are creosotal and similar substances, as guaiacol carbonate, etc., although they have a greater influence upon the general conditions, for example, the cough, than upon the course of the local disease in the larynx. Further are indicated, stomachics, for severe paroxysms of coughing, narcotics, and as a cardiac stimulant alcohol. Local medication is given in the form of inhalations, or the remedy may be brought into direct contact with the diseased mucous membrane by means of the syringe, powder blower or cotton carrier.

For inhalations balsam of Peru, oil of pine, oil of eucalyptus, etc., are employed. Personally I prefer to use inhalations of menthol and intralaryngeal injections of a 10—20 per cent. oily solution of the same; further a 3—4 per cent. solution of boracic acid; and as anaesthetic or analgesic cocain, potassium bromide, antipyrin, morphine and menthol. Powders used as insufflations are iodoform, iodol, dermatol, eucophen, pyocetanin; in ulcerations orthoform, which without doubt has a quieting effect and may relieve pain for several hours. Besides the enumerated medicaments menthol oil, balsam of Peru, resorcin (10—20 per cent.), creosote, glycerin and alcohol (1:40:10), etc., are injected into the larynx.

The most commonly employed remedy is lactic acid, which, rubbed in for its cauterizing effect, produces an eschar. After not less than eight days when this has been thrown off a fresh application may be made. The acid is rubbed in with a cotton swab corresponding in size to that of the ulcer; and since the application is painful the larynx should be cocained beforehand. At first a 20 per cent. solution is used; later the strength is increased, as rapidly as the tolerance of the patient permits, to 80 per cent. or even to pure lactic acid. At the base of the ulcer granulations are seen to spring up; and often cicatrization begins, which by no means is necessarily permanent. Lactic acid is of little service in non-ulcerated infiltrations; here the surgical method, which will be discussed later, is indicated. Some authors have observed the same results from phenolum sulforicinium in 30 per cent. solution applied in the same manner as lactic acid; it is said to have the advantage of being less painful than lactic acid. Similar effects have been attributed by some to a 5—20 per cent. solution of parachlorphenol in glycerin. But the use of all these escharotics presupposes a certain power of endurance in the patient, because their application is painful; although the applications can be made under cocain, the pain reappears for a longer or shorter time after the cessation of the anaesthetic effect. For this reason they are not to be used in debilitated patients, or in far advanced cases in which the possibility of a cure is excluded. Much more to be recommended in such cases, in addition to inhalations, if they are too fatiguing, are the above mentioned injections by means of the intra-laryngeal syringe, or the insufflations by powder blower.

All that has been said thus far relates to the treatment of the ulcerative form of laryngeal tuberculosis. The remaining forms demand surgical interference; and indeed preferably intra-laryngeal, less often extra-laryngeal interference. Where inflammatory oedematous swellings of the entrance of the larynx are present and in perichondritis, the painful deglutition may be relieved by scarification as well as by anaesthetic and analgesic irrigation with the syringe, and by powder insufflations. Scarification is best accomplished by means of the intra-laryngeal lancet.

Submucous injections of iodoform emulsion, creosote solution, etc., have also been made into the infiltrations. Curettage is most commonly employed and deservedly so. This is indicated in ulcerations with exuberant granulations; here the simple curette suffices while the double curette is designed to remove circumscribed infiltrations, large granulatory masses and tumors. The curettage is to be undertaken only after the larynx has been cocained, and if the general condition of the patient is

not too bad, and there exists a prospect of cure, i. e., if the larynx affection has not extended too far. Curettage is also indicated in those cases in which through interference dysphagia or dyspnoea may be relieved. Just as after any intralaryngeal operation, so after curettage the patient must remain quiet and avoid speaking.

The hemorrhages which occur are generally unimportant; and are, as is the case with dysphagia, to be combatted by the swallowing of ice. It is advisable to remove as much as possible at the first sitting and if necessary to repeat the operation after not less than fourteen days have passed. If required, curettage is combined with the lactic acid treatment. The galvano-cautery is of use only in case of small infiltrations; electrolysis is also recommended by some authors, but in any case works more slowly than does curettage; and is indicated only where access cannot be gained with the curette. Of the methods of external interference the most commonly employed has been tracheotomy, which renders the larynx less mobile, a circumstance which has a favorable influence on the disease. Not only may this influence be noted in laryngeal phthisis but also in multiple papillomata of the larynx in children. According to M. Schmidt tracheotomy is indicated in stenosis, when one does not wish to wait until life is imminently threatened, in severe disease of the larynx without stenosis, when the lung involvement is comparatively slight, in cases in which the process in the larynx is rapidly growing worse while the lungs remain in relatively good condition, and finally before the occurrence of stenosis, when dysphagia is present. Thyroidotomy with excision of all diseased tissue, Pienazek advises if no infiltration can be found in the lung, or if when present it is growing less, if on account of dyspnoea tracheotomy has already become necessary, and if the tubercular lesions in the larynx are so circumscribed that they can be easily and thoroughly removed with a part of the surrounding healthy tissue. Although it is not to be denied that these radical operations promise more favorable results than curettage, after which relapses quite frequently occur; because a thorough removal of all the diseased tissue is as a rule not accomplished, still the majority of authors are very conservative in regard to this method and but few patients will consent to an interference so radical.

STEPS IN THE PREVENTION OF THE SPREAD OF TUBERCULOSIS. *

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Common things in life often receive least attention. Anything unusual, having an air of rarity about it attracts the minds of the many. To this rule medicine is no exception. The physician graduates with a thorough knowledge of the differential diagnosis and treatment of some of the graver but less common diseases, but is nonplussed to find that his practice is made up of many little ill-defined maladies rarely touched upon in medical works and generally ignored by his teachers. So medical literature abounds in the description of unusual cases, each practitioner being delighted in citing "the only case on record" or "one of the half-dozen cases reported," while some of those diseases which are before our eyes constantly are almost totally disregarded.

Tuberculosis is one of the most common diseases that we are called upon to treat, and yet its study has been sadly neglected by us as a profession. Ten millions of the present population of the United States will die of tuberculosis, yet the teachings in our medical colleges and the writings in the medical literature upon the subject give us little else than a study of statistics and a description of its grosser lesions.

A short time ago, while sitting in the amphitheatre of one of our best patronized schools, the lecturer came in and apologized to the class for not having a patient to bring before them, saying that there were no cases in the waiting room except tubercular cases and there was nothing of interest in them. After attending the school several weeks and hearing much about the diseases of hearts and kidneys, and seeing some beautiful demonstrations of the science of diagnosis, I asked the lecturer to show us some cases of tuberculosis and teach us how to distinguish the delicate changes in the lung by the physical signs. Here I met the same expression that his colleague had used, "that there was nothing of interest in tubercular chests," and when at the next lecture the tubercular patients were shown to the class, little was brought out except that one patient, who had a slight involvement of one apex, could perhaps be cured, while others who were suffering from more extensive lesions were in a hopeless condition. Nothing of interest in tubercular chests when one person in every seven dies of tuberculosis!

* Read before the Los Angeles Academy of Medicine, March 8th, 1901.

This lack of interest can easily be accounted for by the hopeless view which the profession has held and still holds regarding the treatment of the disease. It is not an uncommon thing to hear members of the medical profession, men who should know better, say that tuberculosis is incurable. Yet these statements are refuted by the records of every post-mortem room, which show that many cases get well of their own accord and without the patients ever having suspected that they were tubercular. The reports of many trustworthy authorities, who are laboring earnestly and faithfully to combat this dread scourge, also show indisputable evidence of many cases cured, some of which were not under their care until the disease was far advanced.

Far from being hopeless, we can now safely say that tuberculosis is curable; not only curable, but if the general practitioners would avail themselves of the means of early diagnosis and treatment which are at the command of the specialists in phthisio-therapy, we could say that tuberculosis is curable in the great majority of instances.

The battle against the spread of tuberculosis must be fought by the general practitioner. He is the guardian of the health and lives of the individual members of the families which employ him, and as such he must ever keep in mind the prevalence of tuberculosis and must be able to recognize it by its earliest signs. If he were called to see a patient with diphtheria and satisfied his conscience by simply saying that the case was one of sore throat and allowed the disease to pass on to the stage where there was no hope, in this day of anti-toxin he would be held as culpable by both the laity and medical fraternity. The day is not far distant when the physician who passes over a case of incipient tuberculosis, treating it simply as a cough or stomach trouble or general run down condition, will be held no less culpable.

The earliest symptoms are such that the patient would scarcely think of consulting a physician in the great majority of cases; yet if he did, the physician should always bear the early clinical signs in mind, and where doubt exists use every means at his command to find out the truth. Too many men have fortified themselves behind the microscope and made it the sum and substance of their knowledge of diagnosis. True it is a valuable aid and has been a powerful factor in interesting men in the study of early diagnosis; but if we hope for best results in the treatment of this dread malady we must not wait for breaking down and cavitation that we may find sputum to examine for the bacilli, but we must rely on our knowledge of the pathology of the disease and our

powers of recognizing these different pathological conditions by the physical signs which we find present.

After sufficient consolidation has taken place to cause a dullness of the percussion note and after râles are heard on auscultation, it still may be considered the early stages of the disease; but surely not as early as we are able to detect and not as early as we must recognize for the most favorable results.

The practitioner who wishes to be able to diagnose incipient tuberculosis must familiarize himself with the pathology of the disease and then train his ear to detect the finest changes. The power to intelligently examine a tubercular chest is an art, not in the possession of the profession at large, as yet, but one which careful study and practice will bring.

The earliest changes which take place in the lung are caused by the formation of tubercles. The eruption may be of only a few limited to a small area, in which case the symptoms would be very slight; or a large area may be involved and the eruption be so dense that softening quickly takes place, making the symptoms quite pronounced from the very start.

In the more favorable cases where the eruption is slight and the area involved small, the symptoms accompanying the formation of tubercle are scarcely sufficient many times to cause the patient to seek medical advice; but we often meet these cases in connection with other ailments, and until the laity become conversant with the fact that the early symptoms are very slight, we will be compelled to find many of these cases accidentally. Such patients, were they to come, and they sometimes do, would say that they are not sick but do not feel well. They complain of loss of appetite, being tired, of inability to exercise without fatigue, and may add that they have lost a little weight, if they are accustomed to take their weight. Upon examination, perhaps nothing will be found except a furred tongue, anaemic mucous membranes and that the patient appears somewhat paler than usual; and if the thermometer were used, in the afternoon or after some mental or physical exertion, a slight rise of temperature would likely be present. The patient may have a slight hacking cough, which is exaggerated upon using the voice, but this is so slight that in many instances he has scarcely noticed it. Physical signs at the period may be absent, or diminished respiratory murmurs with fine crepitation on coughing and slight roughness may be present.

The fever of the incipient stage is variable. It may amount to only a fraction of a degree or may reach 100° or more. Its duration is also

variable. It may last a few weeks or one or two months. After this first rise the temperature may fall to normal, the patient regain his usual vigor and the disease becomes quiescent; or the tubercles may soften and the disease take a rapid course from the very start, running the course of tubercle formation, softening and cavitation with marked rise of temperature and severe prostration of the patient in a short time. When the disease reaches the quiescent stage after the eruption, it may remain so for a few months or even a few years, or it may never cause any further trouble. Again certain areas of tubercles may soften, break down with scar formation, or these areas may become encapsulated, there to remain in harmless state unless an influenza, pneumonia or some other disease affecting the air passages causes a softening of the capsule and liberation of the infection.

During this earliest stage there is no reason why, if the physician is on the alert, that he should not discover many cases of tuberculosis. The following is the history of a case in point: During the winter of 1899-1900 there was an epidemic of whooping cough at Monrovia. A frail girl, aged ten, had a severe attack, but made an apparently good recovery. A few weeks later I was called to see her. I found her with a temperature of 104° , which had been preceded by a chill. Her tongue was furred, but there was nothing to give one a clue to the seat of the trouble. The only history elicited from the parents was that she had not cared to play for several days preceding the attack. I was somewhat puzzled to know the cause of the trouble, but as the old saying goes, "we find what we look for." In this case I was looking for tuberculosis, but so far there was not much evidence. However, as the fever subsided, which it did in a few days, the patient continued to suffer from chilly sensations, with subnormal temperature in the morning and a rise of one-half to one degree in the afternoon. The tongue remained furred and a slight hacking cough made its appearance. Upon examining the chest I could detect nothing save in the right apex upon auscultation the sound was of lessened intensity and had a slightly rough character.

I told the parents of my suspicions, and they, being people of intelligence, were willing to have anything done that would settle the question as soon as possible. I suggested the tuberculin test, which was made, using the "watery extract" of tubercle bacilli (von Ruck). The patient reacted, the temperature rising about two degrees, and the local reaction in that portion of the lung where I had suspected the trouble was well marked.

The patient was put upon the "watery extract" for treatment and every phase of her life was most carefully regulated. In two months she had gained ten pounds and no sign of the trouble could be detected, and to-day she is strong and healthful, more so than at any other period of her life. In such a frail child as she was, had the diagnosis been neglected until tubercle bacilli had appeared in the sputum, I fear that it would have been too late, and she would have gone the road travelled by millions of others who, could they live in the near future, would be spared consumptives' graves by the improved methods of diagnosis and treatment which will be at our command.

While the initial chills and fever in this case may not be accurately accounted for, I believe them to have been due to the softening of a tubercular gland, perhaps in the mediastinum; and the infection of the apex was perhaps an extension from that focus.

Regarding the frequency of making the diagnosis in this early stage, I would like to cite the report of Weickert of Görbersdorf. Of fifteen hundred cases diagnosed as tubercular by the physical signs, in about one-third of the cases no tubercle bacilli had yet appeared in the sputum.

It is unnecessary to say that if our cases could be diagnosed in this early stage, and the proper treatment were instituted, the mortality would be almost nil; so wherever the diagnosis is in doubt it must be settled as speedily as possible. Fortunately we have at our command the tuberculin test, which in the hands of careful men, and this should include all practitioners of medicine, is safe and reliable. The reliability of the tuberculin test has been called in question by many writers and statistics recently collected by a German observer shows positive results in only 54 per cent. of cases; but this failure is undoubtedly due to faulty technique, for those who are best acquainted with its use report a very small percentage of cases wherein tubercular patients do not react. Some observers forget that there is a two-fold reaction—one general, the other local, and failing to observe the rise of temperature class the test as a failure. The test dose where possible should be given in the early morning and then a regular hourly or two-hourly temperature chart should be made and the chest should be examined carefully for the local reaction. Then, too, if no reaction has taken place by bed time it is not to be declared as a negative result, for sometimes the reaction is delayed. Especially is this true of the local reaction. Another source of error lies in the tuberculin used. Much of the tuberculin has not been standardized, and so different specimens have contained different proportions of solid mat-

ter. Those who have used a standardized product report very satisfactory results. In veterinary practice, where the test is made carefully and without fear of doing harm, the reported failures from 8000 trials is only 3 per cent.

Some fear that harm may be done by the use of the tuberculin, but this is not sufficient reason for discarding it, for what one of our standard remedies is not capable of doing harm when used in an improper manner? Much of this fear is based upon the early reports of cases when tuberculin was entering upon its period of trial and misuse. It is a significant fact that at the Tuberculosis Congress held in Berlin in May, 1900, not a single voice was raised against tuberculin. The old fear had not only passed from the minds of the members, but they were earnest in its praise. No less a writer than Cornet says, in a recent article, that the claim that tuberculin can give rise to a general infection has never been proven. He then cites his own experience with four hundred and twenty cases, all of which showed only the happiest results.

With such testimony before him, no physician should wait for bacilli to appear in the sputum in cases where the physical examination leaves the diagnosis in doubt, but should either make the tuberculin test himself or call some man in consultation who is familiar with its use.

If the diagnosis is not made at this early stage, as the disease begins to advance, other symptoms will appear which make the diagnosis most probable and these even before expectoration and the finding of bacilli in the sputum. During recent years many of these early signs have been mentioned in the literature of tuberculosis, and doubtless are familiar to most of you. The interrupted respiratory murmur has received quite a little attention, but it must be differentiated from the interrupted murmur that we often find in nervous patients. Pleuritic friction sounds are claimed by some authorities to always be of tubercular origin. Fine râles found in limited areas, especially at an apex, or along the lower border of the clavicle or along the vertebral border of the scapula may at times be detected before bacilli appear in the sputum and are always to be looked upon with suspicion. Circulatory disturbances, frequent chilly sensations, bright cheeks, glistening eyes and dilated pupils have all been noted as symptoms which should call for an examination of the chest. Patients in the early stage of the disease also show an inability to take deep breaths without coughing. If the tubercles are sufficiently close together and the eruption sufficiently extensive, dullness will be present and the respiratory murmur will take on a harsh character and vocal resonance will be increased.

With all these early signs at our command and the tuberculin test to confirm or disprove our diagnosis, we can feel ourselves quite independent of the microscope and cure our patients before bacilli are found in the sputum. You may say such a possibility is an idle dream, but remember the same could have been said of immunizing against and curing diphtheria with anti-toxin only a few years ago, but to-day it is a fact; and why may we not have such another revolution in the field of tuberculosis?

In order to make advancement in the battle against tuberculosis, we must do more than make an early diagnosis. When we have done this we have just begun. There is a duty that we owe to our patient and also to those who must care for him; that demands that we inform him of his trouble.

I believe the manner in which physicians have dealt and are still dealing with their tubercular patients is one of the greatest mistakes that the profession is making today, and I further believe this to be responsible for a great number of the deaths due to the disease. Physicians are not candid with their tubercular patients. For fear of frightening them they do not tell them what their trouble is, but give it a name corresponding with some chief symptom, such as "throat trouble," "bronchial trouble," "stomach trouble" or "liver trouble." With this, the patient goes away with a false sense of security, allowing the disease to fasten its grip more securely upon him, and scattering the bacilli broadcast to infect others. Of course it is a shock to a man to tell him that he has tuberculosis, but is it not better that he suffer a shock and know the nature of his malady than to go about in ignorance reinfecting himself and infecting his family and friends?

It is not necessary to quarantine against tuberculosis, nor is it necessary to make the patient feel that he is an outcast, but it is necessary and it is demanded of us as a profession to give tubercular patients such instructions that the danger of infection be reduced to a minimum. If tubercular patients employ the proper personal hygiene, they are not such great sources of danger to the health of a community; but in order for them to employ this care they must be made aware of their malady.

Tell the patient that he has tuberculosis. Explain to him that it is a germ disease and that the sputum is the chief source of danger, and that unless he is careful in destroying it he is liable to reinfect himself and also to infect those dear to him. If he has not developed the proper amount of altruism to care for his friends, the danger to self will appeal to him, and selfishness will cause him to exercise caution. It is not sign-

ing a death warrant to tell a man that he has tuberculosis, but the neglect of telling him will make many warrants necessary.

All physicians who practice in health resorts frequented by tubercular patients are amazed to find those in the last stages of the disease who have never been told by a physician the true nature of their trouble. Recently I examined a chest with large cavity in the right apex. Percussion brought out tympany and cracked pot sound and auscultation showed amphoric breathing. It was as plain a case of cavity as is usually found. The patient had had three copious hemorrhages, and had been treated by no less than half a dozen physicians, and yet I was the first one that had dared tell him that he was tubercular. His wife and child are with him and he had been caressing them, drinking from the same glass and oftentimes eating from same food as they, without any regard to danger, because he was not aware of there being any danger. I explained to him the necessity of care and he was frightened, saying that all of his wife's brothers and sisters had died of consumption and that he had come to California for a rest for himself and hoped that the climate would also prove beneficial to her. As a profession, we must not allow our patients to be such sources of danger if we wish to maintain that respect which is due us as the guardians of the health of the communities in which we live.

Not only is it necessary to inform the patient in order to reduce the danger of infection to a minimum, but also that we may have his co-operation in the treatment of the disease. Little things count much for the welfare or detriment of the patient, and unless aware of the nature of his trouble, he will be guilty of many indiscretions, some very slight it may be, but all of which tend to retard or prejudice recovery. It is not an uncommon thing for a patient by an indigestible meal, an evening's dissipation or an overexertion to lose more than can be gained by a month's skillful treatment, and these things cannot be avoided unless the patient understands the nature of the fight that his system is called upon to make.

With early diagnosis and with the early informing of the patient as to the nature of his trouble, so as to secure his earnest and intelligent co-operation in the cure of his individual case, and also in the prevention of the dissemination of the contagion, we have taken two of the first steps necessary to check the ravages of tuberculosis.

TUBERCULOSIS DUE TO TOXAEMIC STATES.

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There are two facts which I wish to make prominent in this paper: One, that tuberculosis is dependent on states of toxæmia where the poisons are introduced from without; and, when formed within the body. The other is that the bacillus of tuberculosis is only active and dangerous when the favoring soils and conditions are present for its development and growth.

The widespread diffusion of the germs of tuberculosis in the air, water, food and surroundings, and wherever human beings congregate, has attracted attention and indicated the possibility of in some way destroying them and breaking up their habitat.

Thus, efforts to prevent the sputa from drying up and floating about in the air and so being inhaled again into the lungs are carried out with more or less rigor in cities and towns.

Wherever consumptives are found the destruction of the sputa is considered a prophylactic measure of great importance.

The dust-laden air of our northern cities and the large number of tuberculous patients seem to make it impossible to thoroughly destroy these germs, which are often carried in the clothing, and must, of necessity, exist in the surroundings of consumptives.

Notwithstanding this widespread diffusion of these germs comparatively few persons become infected by them.

A recent writer thinks that all persons in the northern climates and in the consumptive belts are exposed to this infection, and that sometime during their life these germs have effected a lodgment, but for various reasons have been thrown off and prevented from full development. He cites as proof the common experience of nearly every person who at some time has had severe attacks of bronchitis or debilities, with symptoms of disturbance of nutrition, high temperature and night-sweats. After a time these symptoms disappear and long after when such persons die, cicatrices in the lungs point to a previous deposit which has been overcome.

The records of post-mortem examinations in large hospitals show the same facts and indicate that tuberculosis has existed at some previous time but had been checked.

These and similar facts show conclusively that an early infection

is not only possible, but probable in many persons, but for some reason it is checked in its growth and does not go on to full development.

The extreme fatality of tuberculosis has been diminishing, and there is a strong probability that more exact medical care and study will reduce it to a minimum and practically stamp out this "great white plague."

This change is due not so much to the medicines used as to the hygienic conditions and early recognition of the causes and the means for prevention.

The removal of these causes and the cultivation of conditions which tend to increase and strengthen the vital forces are the directions in which preventive measures are leading.

One of the active causes which seem to precede and favor the growth of tuberculosis is faulty nutrition.

Recently it has been recognized that failures of nutrition result in the formation of poisons which have a very marked influence over states of health and disease. Some facts of the physiology of food will make this more clear.

The fact is well established that the vigor of the body depends upon the nutrition which it receives.

This in a general way must be albuminoid material, which is furnished by fish, meat and eggs, and which must constitute about one-fifth of the weight of the entire food.

The hydrocarbons or fats required are about the same proportion, and the carbohydrates, consisting of starch and sugar, must form about three-fifths. These foods in about the same proportions are necessary for full health and vigor.

There will be some variation due to occupation and climate, but the general average will hold good.

If too much of one and too little of another is used there will be disproportion and derangement, and if continued long enough there must be degrees of starvation, and at all events material introduced into the body which cannot be used becomes waste, and therefore a source of infection.

As a common example, the ordinary meals taken by persons who live in hotels and who travel will suggest this source of danger. The breakfast at such places includes meat and eggs in quantity over one-half by weight, and the luncheon more than one-half albuminoid matter; and the dinner is the most unhygienic of all. Such dinners consist of oysters or clams, with soup, fish and roast meat, and various kinds of entrees.

These are served with vegetables and belong largely to the proteid foods which should not exceed one-fifth of the total amount taken. When there is added bread and the common dessert, the proteids may be brought down to a half, but not less. Then come the carbohydrates, consisting of starch and sugar in large quantities, which, taken into a normal stomach, will seriously impair the salivary digestion and destroy the power of the pancreatic juice.

The sugar and starch in the dessert is injurious to all persons in whom there is a tendency to fermentation.

In addition to these come sauces and condiments, which produce by overstimulation of the glands a large flow of gastric and other juices, so that the desire to eat is increased far beyond the ability to properly digest the foods. The digestive glands are exhausted and cannot do the work required. Often along with this excess alcoholic beverages are used. Alcohols impair the digestive processes and lessen the function of the stomach and produce equally serious damage with that of the large proportion of proteids which can neither be broken up nor assimilated.

Under the direction of ignorant cooks and caterers foods are served to everyone, from childhood to old age, as if the peptic glands were disabled and in constant need of the most energetic stimulation. Also as if three-fifths or four-fifths of all food should be nitrogenous instead of one-fifth.

As the result the daily diet of all persons is irrational, unreasonable and disease-producing. The digestive functions suffer from *toxaemia* produced by decomposition of foods which cannot be used. Also from irritants taken as condiments and peptic stimulants.

The secretory organs are overtaxed, the liver is burdened, the intestines and kidneys have an increased amount of secretory work to do, which is followed by early exhaustion.

These are the conditions which provoke many maladies, which the terms *lithaemia*, *uric-acidaemia* and other obscure forms of auto-intoxication describe.

Probably no one substance in common use disturbs the nutrition and impairs the vigor of the body more positively than alcohol.

Statistics of consumptives show that a very large proportion of these were spirit and beer drinkers in the early stages, with marked symptoms of dyspepsia, faulty nutrition and exhaustion.

Spirit and beer drinkers are practically starved, and suffer from poisoned states through derangement of nutrition and foods taken which cannot be utilized.

One author claims that eighty per cent. of all consumptives have used spirits or beer in excess before consumption appeared.

From many inquiries it would appear that fully fifty per cent. of spirit and beer drinkers in northern climates die of consumption. The relation between consumption and drinking is very close.

The subsidence of the drink craze is often followed by acute tuberculosis and death.

The use of spirits to excess not infrequently masks and covers up the symptoms of tuberculosis, but it is quite certain that it never cures the disease.

Both spirit drinking and consumption seem to be dependent upon exhaustion, imperfect nutrition and poisoned states.

Alcohol seems to have a specific power to change and destroy the normal metabolism of the body.

All users of spirits suffer from the presence of waste products, which accumulate in the system and seriously interfere with the normal metabolism essential to health.

A great variety of elements sustain these theories and point out the specific causes with great exactness.

A careful study of the history of many cases of tuberculosis shows a period of faulty nutrition from irregular habits of eating, bad foods badly cooked, associated with beer, spirits and other substances damaging to the vigor and health of the body.

Faulty surroundings is another very active cause of pathological conditions which favor the growth of the tuberculous germ.

Thus, in an examination of the homes of a large number of persons having consumption in villages and country towns of Massachusetts, it was found that more than half of the number of homes contained wells or springs in the cellars under the sleeping and living rooms. Also that these rooms were badly ventilated and wanting in proper supply of sunlight.

In many instances trees and vines shut out both light and air.

Homes on streams and in valleys exposed to the dampness and screened from sunlight showed a larger proportion of consumptives than dwellings situated in better conditions.

The well-known fact has been confirmed over and over again that dark alleys, ill-ventilated back rooms, prison cells, factories and dark homes furnish a large number of consumptives.

These are the contributory causes, which, by lessening the vigor and force of the body to throw off the poisons of the system and creating

states of starvation, defective nutrition and auto-intoxication, furnish favorable soils for the development and growth of the bacillus.

The common neglects of the body are other causes of tuberculosis. These, of course, include a great variety of injuries and faults, the more common of which may be mentioned, as, want of rest, both mental and physical.

In our high-wrought civilization the nervous system is so kept on a continual strain, that the power of recovery is soon so far diminished that exhaustion and starvation follow.

Neurasthenic states are said to be the direct result of poisons which follow from imperfect nutrition and the formation of poisons which the system is unable to throw off; and along with the incessant mental strain is often neglect of proper bathing. The waste from mental and nervous activity is not eliminated and becomes a source of further exhaustion. The kidneys and excretory organs are overworked in the effort to remove these poisons, and as a result Bright's disease, diabetes and other troubles follow.

The opposite of overwork, underwork, is also a prolific cause of the same general disturbance and faulty elimination.

Irregular work with excessive strains and long periods of rest break up the normal rhythm of the body and provoke congestion and irritation.

One writer affirms that the excessive perspiration which is a common symptom of tuberculosis is simply an effort of nature to throw off the poison states which exist in the body; also that the nerve centers which control this function take on a paroxysmal period of activity in their efforts to eliminate the toxins.

Practically it is found that great care is necessary to remove the poison from the body by washing with water and rubbing with dry towels, treating the patient very much in the same way that we remove the sputum and destroy it to prevent its being absorbed. In night-sweats the change of underclothing and frequent bathing of the body secures the same thing.

These sources of disease are very active, and in some instances are beyond all question.

The toxæmias which follow from these conditions are due to disturbances within the body.

Where spirits are taken the toxins seem to be introduced from without, and form active sources of still further depressing conditions with enfeebled resisting powers of both the blood and nervous centres.

After the disease is manifest another source of danger comes from overmedication.

Formerly spirits entered largely into all early remedies; now they are found to be injurious.

The depression and paralysis which follow from their use are practically a continuous series of shocks to the nerve centers as well as introducing other toxins which further depress the vitality of the body.

Remedies given for the purpose of destroying the bacteria, or chemical agents to inhibit the germ growths, are exceedingly doubtful in their practical value.

It is evident that spirits conceal the progress of the disease by their anaesthetic action and encourage degenerative states, favoring an early and sudden collapse.

An exceedingly dangerous advice is not infrequently given by thoughtless physicians to use all the spirits possible. This is usually fatal.

When the diagnosis is clear the conditions present should indicate the medical means most essential.

First, the toxins formed in the body should be neutralized and removed.

The danger of reinfection from the germs should be reduced to a minimum by removing the patient to some condition of surroundings where reinfection would be difficult.

Cod liver oil and emulsive mixtures may be in many cases most dangerous vehicles for the formation of toxins by further destroying the nutritive balance and increasing the waste.

The old theory to feed the patient to excess assumes a normal digestive capacity, which very rarely or never exists, and is a fallacy.

Foods unfitted for the conditions present are far more dangerous than helpful because they may impair and increase the conditions of faulty nutrition already existing.

Foods containing a disproportion of the normal demands are also disturbing.

A study of the nutrition is the most essential thing in the early treatment or the possible prevention of consumption.

Change of surroundings and conditions of life and living are not more important than the study of nutrition.

Albuminous foods or carbohydrates in excess in a debilitated impaired digestion furnish new sources of infection and diminish the power of restoration.

The modern trend of public opinion in the most advanced treat-

ment is a recognition of these great principles of poisoning and their removal.

Public hospitals in mountain regions and regulation of diet, removal of sources of reinfection and auto-intoxicants, are thoroughly preventative as well as curative.

Some of the conclusions I wish to make prominent are:

First. Tuberculosis in this climate follows auto-intoxications and poisoned states of the body.

Second. After tuberculosis has been established, numerous and complex toxaemias follow which not only intensify but increase the rapidity and fatality of the disease.

Third. Toxaemias following overwork, bad nutrition and various other and allied causes are very common, and can be prevented by a larger knowledge of the more common hygienic measures essential to good health.

Fourth. Alcohol in all forms is a very potent cause of toxaemia and the disease inebriety is very closely allied to tuberculosis. It not only precedes this disease, but increases its growth by lessening the vigor of the body and intensifying the degenerations which tuberculosis produces.

Fifth. Both of these diseases depend on toxaemias formed in the body and poisons introduced from without. With both are associated defective nutrition, defective elimination and faulty metabolism.

Sixth. In the treatment of tuberculosis the most important danger to be corrected is that of poisons generated within the body; also the elimination of these toxins, and the avoidance of all food and fluids which are productive of toxins or act as media for the growth of the specific germs.

Seventh. Reinfection from the tuberculosis germ in the air, in the clothing and from other sources can, in a large measure, be prevented by isolation and correction of the sources from which they spring.

Eighth. The restoration of the vigor and the lost resisting power of the organism can be obtained best from a study of nutrition and the utilization of foods that can be digested without damage from the waste of overfeeding.

Ninth. The scientific treatment of tuberculosis and its effectual stamping out and prevention must depend largely upon studies of nutrition and surroundings and the means and measures to break up the sources of poison which perpetuate the disease.

A SINGLE EXPERIENCE WITH VON RUCK'S TUBERCULINUM PURIFICATUM.

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Mrs. C., 29 years of age, called upon me in January, 1900, complaining of tenderness and pain in nose, with a thick discharge, and the formation of large scabs in the nose. These conditions had been noticed for the past 3 or 4 weeks. On two occasions during this time she had coughed up what she thought was gristle; she showed the pieces to her husband, threw them away, and thought no more about them. About the time that she called on me a small piece of ragged bone was found on the handkerchief after blowing the nose.

Examination of the nose showed redness and swelling, with entire loss of the triangular cartilage; a large irregular ulcerated surface, discharging pus, along the inner surface of the left ala of the nose. Examination of the mouth showed ulceration of the uvula. No history of tubercular or syphilitic infection.

Anti-syphilitic treatment was instituted, based upon the rapidity of the process, the dual location of the ulcerations, involvement of the osseous tissue, and a history of repeated abortions at two months or less with no local cause for them, in a patient anxious to have a family.

Mercurial treatment was not followed by improvement, and potassium iodide was added. Ulcerated surfaces were treated by local application of fuming nitric acid. Such treatment was followed by more rapid increase of ulcerations, and in the course of two weeks a greyish-white patch appeared on the roof of the mouth, in the proximity of the ant. palatine fossa; this patch was easily pierced by a probe, beneath which bare bone was detected, and it was possible to crowd the probe through the roof of the mouth into the floor of the nose.

Patient was advised to consult a throat specialist, who considered my slough a fungus, and returned with a written diagnosis of stomatitis aphthosa. This was shortly followed by the loss of one upper incisor tooth, with loosening of one on each side, together with ulceration of gum which had surrounded the lost tooth, and necrosis of the alveolar socket. During this interval the ulceration on the roof of mouth, near

*Read before Albany Medical Society, April 10, 1901.

ant. palatine fossa, had extended backward. Fig. 1 shows condition of roof of mouth, upper lip everted.

Impressed with the conviction that this was something more mischievous than syphilis or aphthous patches, microscopical examination was made of the discharges, and tubercle bacilli were demonstrated.

It was now the middle of March; mercury and iodide had failed, and tubercle bacilli were demonstrable.

Koch's tuberculin, "new," was then used, beginning as per directions with 1-500 milligramme of "solid substance." In 5 weeks the dose had been increased to 2 milligrammes repeated in two days. The largest and the last dose of this preparation was 4 milligrammes, which is the amount of solid substance contained in about 1-2 c. c. of the solution as sold.

During the reaction following the initial doses of 1-500 milligramme there was no rise of temperature, but severe headaches, which had not been present before, general malaise, anorexia, nausea, but no emesis, and marked prostration, with considerable soreness at point of injection. This dose was not increased during the first week of treatment. Doses of 2 milligrammes were soon followed by occasional chills, and paleness and coldness of extremities. Doses were reduced and again gradually increased, with the same train of symptoms, patient feeling indisposed to move from bed or couch during the greater part of the day. Doses of 3 and 4 milligrammes were followed in about one hour by death-like paleness of extremities and lips, and perfectly cold extremities, with cardiac palpitation.

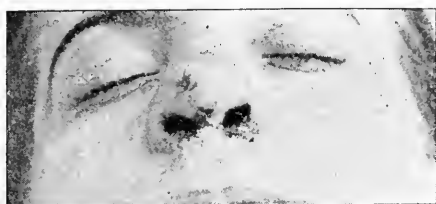
During the administration of Koch's new tuberculin the ulcerations present at the beginning of the treatment showed a tendency to heal, and the soreness of the nose had somewhat improved. An enlarged lymphatic gland which was present beneath the body of the mandible on the left side entirely disappeared. But during its administration a new ulcer appeared at the junction of the uvula and soft palate, on the left side, which was finally checked in its extension, but not healed by the local application of lactic acid.

Again consultation was had. Patient was taken to another nose specialist and a surgeon specialist. They separately agreed that although tubercle bacilli were present, there was syphilitic infection, based upon the rapidity of the process, and the involvement of the osseous tissue.

Acting on this advice, tuberculin was discontinued and mercury with large doses of potassium iodide were given, with the result which accorded with my former experience with the same drugs in the beginning



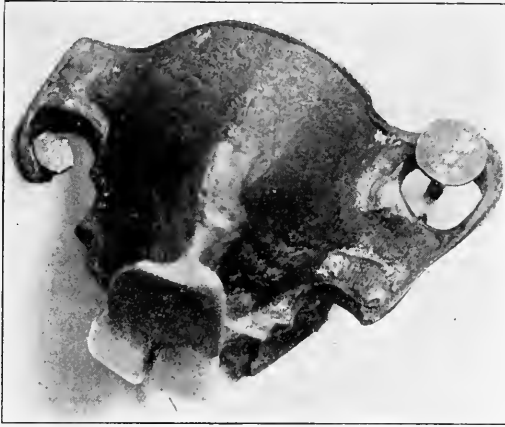
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of my treatment, except that the ulcerations were noticed by her husband and myself to increase more rapidly. The ulcerations crept along the lower margin of each nostril to the cutaneous septum between the nostrils (the cartilaginous septum was gone before I saw the patient). During the use of the mercury and iodide the tip of the nose became very red, and two small ulcers appeared upon it. The nasal discharges, which had lessened under tuberculin, again increased, and the extreme soreness returned. Figs. 2 and 3.

Von Ruck's tuberculinum purificatum was now ordered by telegraph from Asheville, N. C. When it arrived, May 25, the cutaneous septum between the nostrils was growing rapidly thinner, so I feared it would not be able to support the end of the nose.

On May 25 a solution was made in the proportion of one minim (equivalent to something over 1-20 c. c.) of the medicament, von Ruck's tuberculinum purificatum, added to 4 minims of a 20 per cent. solution of glycerine and distilled water; each 5 minims of this mixture contained 1-20 c. c. of the medicament, the tuberculinum purificatum.

Twenty minims of such a solution were given for the first hypodermic injection, equivalent to 1-5 c. c.

There were no constitutional symptoms, and no soreness at points of injections. The injections were rapidly increased in amount and soon were given pure, with no dilution with the glycerine solution.

June 1 (10 days after preparation was commenced) and June 2 the patient received in the morning 5 c. c. double strength purified tuberculin (equivalent to 10 c. c. single strength) and the same amount in the evening.

The improvement in the ulceration was very rapid from the first. My great anxiety to save the corroding cutaneous septum was rewarded by the sight of new tissue encroaching daily over the raw surfaces. During the use of von Ruck's preparation she was not obliged to remain in bed on account of constitutional disturbances, as while using Koch's. She gained strength constantly and soon came twice a day to my office for the injections. June 4 the ulcers on the tip of the nose were healed and the redness had almost disappeared; the marginal ulcers were healing as rapidly as they had previously increased. June 7 every visible ulcer had healed except that on the roof of the mouth, which was kept open by the presence of necrosed bone beneath. (Palate process of sup. maxilla).

Injectons were continued, and June 27 all necrotic bone was removed by curetting. This resulted in a free passage between the roof of

the mouth and the floor of the nose. One of the loosened teeth was extracted and the alveolar margin corresponding to the two lost teeth was removed. Thus, by elevating the upper lip, it was possible to throw water from a syringe directly into the nose.

Regurgitation of liquids from the mouth into the nose was prevented by a temporary roof made from chewing gum, while allowing sufficient time for the parts to contract before fitting a dentist's plate.

Patient has remained well and gained in general health, with very little external disfigurement, except that the end of the nose has been drawn downward by the cicatricial contraction. She has worn a well-fitting dentist's plate carrying two teeth since in December 1900, without annoyance. Fig. 4.

It is of interest to notice the absence of objectionable symptoms under von Ruck's purified tuberculin during a very rapid increase of dosage, together with the decided and permanent results obtained in this case. Fig. 5, condition of mouth healed as it has been since August, 1900.

On questioning the patient again about this time, I learned that she had noticed an itching in the nose and frequently picked and rubbed it as far back as August previous to the January when I first saw her.

Von Ruck prepares his purified tuberculin in the following manner: "The tubercle bacilli are grown upon glycerine bouillon; when the cultures have matured, that is to say, when the tubercle bacilli have grown to a thick film and show no further growth, and when the surface layer breaks off and begins to fall to the bottom, then the fluid, inclusive of the bacilli, is boiled *in vacuo*, at a temperature of about 130 degrees for two or three months. The object of this prolonged boiling and maceration is to extract from the tubercle bacilli as many proteids as possible.

"After such prolonged boiling the fluid is also concentrated in the same manner as Koch concentrates his, but it is further treated by the addition of an alkaloidal reagent (sodic-iodide of bismuth dissolved in acetic acid), by which the beef peptones and proteids from the meat extract are precipitated.

"When the reagent causes no further precipitation the precipitate is filtered out, and the filtrate is again made alkaline, by which the sodic-iodide of bismuth is caused to precipitate; filtering again, we again precipitate the filtered liquid by the addition of absolute alcohol, and the precipitate which is now formed is dried and dissolved in distilled water and standardized in such a manner that the remedy has a given strength."

The preparation used in this case is not the same as von Ruck's watery extract of tubercle bacilli.

ORIGINAL TRANSLATIONS.

A CONTRIBUTION TO THE QUESTION OF PEOPLE'S SANITARIA.

TRANSLATED AND ABRIDGED FROM THE MONOGRAPH OF DR. HANS WEICKER OF
GÖRBERSDORF.*

With the expiration of the year 1899 the sanitarium "Dr. Weicker's Krankenhaus" looks back upon six years of existence, and during this period has undergone development in a manner which is characteristic of the sanitarium movement. The number of patients discharged from treatment has increased annually, as has the number of hospital days.

The institution was established by Weicker in the spring of 1894 with the definite intention of realizing Gebhard's idea of the coöperation of the sanitarium movement with insurance.

A roomy villa was sufficient for all demands at the outset. Lofty, well-ventilated rooms; covered verandas looking toward the south and southeast, and well adapted for the rest cure; a roomy dining-hall, and shady garden combined to make this house well adapted for sanitarium purposes.

At first the undertaking was looked upon as a species of *inter-regnum*, which should furnish to the insurance institutions—as yet unable or unwilling to build for themselves—a place of sojourn adapted for their consumptive risks. With this end in view villas were rented from the Brehmer sanitarium at Görbersdorf, the lessee assuming full charge of the treatment and maintenance of patients.

The conditions afterwards underwent alterations along the following lines. As the "Krankenhaus" grew the necessity asserted itself for securing as far as possible the self-control of the increasing number of villas which constituted the sanitarium. At the present day there are nine houses with 180 beds for male patients, and seven houses with 100 beds for females. These two departments are in different quarters of Görbersdorf.

In an institution of this sort with patients recruited from all ranks of society, it goes without saying that the question of discipline is one of great importance. A long series of regulations in regard to the duties and privileges of those concerned was compiled, with especial reference to the suppression of frivolity and whatever tended to injure the honor of the establishment.

*Beiträge zur Frage der Volksheilstätten. Berlin, 1901.

With so large a hospital material (67,077 hospital-days during 1899), it is self-evident that transgressions of these regulations, both open and secret, were bound to take place. Nevertheless the limited size of Görbersdorf militated against the repetition of excesses by making detection easy. It was always emphasized to the patient that the prospect of recovery hinged upon the faithful carrying out of all details of treatment, and that all individuals who could not grasp the situation in all seriousness were unsuited for treatment. Whenever excesses came to the knowledge of the management, the grosser sort or the repetition of offences, brought about the expulsion of the transgressor. Such incidents were posted on the blackboard, giving the grounds which were held to justify this summary dealing with offenders, and doubtless this course served as a deterrent to other inmates. It does not appear that discipline is harder to enforce under the cottage plan than in a single large building. It is much better to expel a patient at once than to attempt the use of repressive measures in the sanitarium.

At the present time there are four physicians in the sanitarium (besides Weicker), one of whom is stationed in the woman's branch. Since February 1, 1901, a college-instructed tutor has been a member of the staff, and officiates in both the male and female departments. Years of experience have taught that lack of occupation operates unfavorably towards recovery. Individuals with but a slight consciousness of illness, and who almost invariably feel a daily impulse toward labor of some sort should not be left to themselves. *Ennui* manifests itself in various ways. The active become involved in petty excesses and transgressions which would signify nothing in health, but mean mischief to the tuberculous; while the reflective temperament causes brooding. It would be difficult to maintain these patients with resources for bodily exercise or labor, and a staff of officials would also be required to carry out such a provision. The medical men have too much other work on hand and could not assume charge of such an undertaking. It was therefore decided to adopt the plan already mentioned of giving tuition to these patients. There is no odium attached to the notion of study, as there is in the case of work, and many patients who would in any case be unequal to the demands of physical toil are able to perform mental labor without prejudice. Great interest is exhibited in natural science—geology, astronomy, zoology and botany. Excursions with the teacher for the purpose of forming a cabinet found active coöperation on the part of the patients. The course in stenography, both for beginners and ad-

vanced students, was always well attended by both sexes. Instruction was carried out as far as possible in the open air. One evening in the week was also devoted to a lecture or demonstration. As the teacher had taken holy orders he also officiated on Sundays as chaplain.

The question of the care and oversight of the patients in the male department is in charge of male attendants from the Diakonenanstalt Zoar. Ordinary nursing is necessary for patients with *chronic* tuberculosis, but is not indicated in a people's sanitarium, where few of the inmates need waiting on, and where the sick-attendant sees before him people who comport themselves for the most part like healthy individuals. The deacons or attendants at the "Krankenheim" do not act in an executive capacity, but simply observe and caution the patients. They are required to have a fundamental idea as to the treatment of tuberculosis. Their duties are not those of police, but of simple protection. Such attendants should possess much tact and know how to speak the right word at the right moment. Constant association with the patients teaches an intelligent custodian the peculiarities of individual character. The weekly reports of these men give assurance of their good observation and judgment.

It follows that the position of custodian in a sanitarium is by no means a sinecure. At the outset there are difficulties encountered in instructing the custodian in his duties. He is to be in one sense an attendant and in another he exercises authority in maintaining discipline. The patients are often inclined to look upon the custodian as an arbitrary official, with an excess of zeal in his calling, and only gradually do they come to a full realization of the relationship between the custodians and themselves.

The management of the Diakonenanstalt Zoar have visited the "Krankenheim" in order to confer with the medical staff as to the principal qualifications which should be in evidence when a deacon is selected. It would fulfill a want if the Diakonenanstalten should give special instruction to the brothers in regard to the duties of sanitarium attendants. If this were done, the rapidly increasing number of these sanatoria would doubtless cause a demand for such attendants in preference to any others.

All that has been said concerning these deacons or nursing brothers applies equally to the Sisters of the Evangelical Society of Deaconesses who are in charge of the cottages for female patients.

The "stomach-question" is a chief factor in the management of a sanitarium—in fact it is the most important of all factors from the stand-

point of the patient. There is difficulty in preparing sufficient variety or alternation in the dishes, since the choice of raw material is limited. Many dishes seen on a good table in private families are looked upon with distrust, such as hashes of any sort, rice, etc., etc. Patients come to the "Krankenheim" from all parts of Germany, and are habituated to certain dishes, especially on Sundays, which they do not get in the sanitarium. Many of them do not relish the new and strange dishes they encounter away from home, and they are very strongly influenced and prejudiced by the cookery. The size of the ration elicits no complaint, but the mode of preparation appears to be everything with many of the inmates. It once happened that a certain dish was eaten without criticism at one table, while in another cottage the very same food was left unconsumed.

By reason of the frequent association of gastric disturbances with tuberculosis, dietetic specialties become necessary. Preparations of albuminoids, especially tropon and plasmon are freely used, by reason of their adaptability and palatability. Plasmon has been used only as an adjuvant to other dishes. It is probably the more palatable of the two substances.

By agreement with the insurance companies, a pint bottle of beer is furnished to each patient daily. The patients are told that the beer is to be looked upon purely as a luxury, and not as a part of the diet. Upon this basis, the withdrawal of beer from the daily ration is used as a punishment for petty offences. Considering the large number of patients in this sanitarium, abuse of alcoholics has been observed very rarely. The patients are strictly prohibited from visiting the inns in Görbersdorf, but manage at times to obtain liquor in resorts outside of the town.

Elaborate statistics show that a term of 12 weeks' treatment is necessary for the majority of patients, it being understood of course that these subjects are in the initial stage of the disease. It appears to be well to proceed upon this basis, and discharge the patients at the end of about three months, and then readmit them for a second term if relapse occurs. It is a fact that second term patients are usually appreciative and tractable. During 1899 twenty-nine patients were re-admitted either for a second or third term. Most patients, whatever their condition during the first sojourn, leave with hope of being able to return if their disease relapses. This wish is expressed incidentally in writing

upon a blank form which the patient fills out at the time of his discharge.

Pay patients with tuberculosis in ordinary institutions do not average as long a period of sanitarium life as the consumptive-insured. The self-supporting patient must of course get back to his work as soon as he is able. Naturally then the results are better in the insured class.

Since the stage of tuberculosis plays such an important part in results, it has been found expedient to make five instead of three periods in the evolution of the disease. The ordinary sub-divisions are therefore recognized with the addition of an intermediate period between the first and second and another between the second and third stages.

The statistics of the "Krankenheim" for 1899 are based upon the 881 patients who were discharged from the institution during that year. Of the men, 32.4 per cent. were out-door workers, 36.7 per cent. were indoor workers (clerks, teachers, light manufacturers, etc.), and 30.5 per cent. were individuals who plied heavier trades mostly in connection with metal work, with or without high temperatures. Of the women 31.5 per cent. performed some sort of house-work, 25.2 per cent. were seamstresses, milliners, etc., 32.8 per cent. were factory hands and the balance did clerical work.

The majority of all patients were in the third decennium of life. The three quinquennia between 20 and 35, were represented by about 66 per cent. or approximately two-thirds of the entire number.

The disease had been present in a parent in 34.6 per cent. of all cases. This number is higher than that obtained by Reiche in a much greater material, viz.: 32.7 per cent. It is safe to say that two-thirds of all cases are free from parental inheritance. Turban's view is upheld that tuberculosis in the ascendants does not prejudice the prognosis.

In regard to the patients' physique and general set-up, about one-fifth could be classed as robust, two-fifths moderately well built and two-fifths as delicate. About 30 per cent. were good enough for acceptance for military duty, and nearly 60 per cent. were ineligible. The balance had not yet been tested in this respect.

Answers touching the use of liquors and tobacco were in general colored by the patients. Every attempt to place this subject on a statistical basis met with failure.

In addition to the facts already stated as to occupation other figures are forthcoming as to occupations which are known to be especially hazardous for tuberculosis: thus nearly one-third were exposed to some

kind of dust, and in over 10 per cent. the occupation was especially exhausting.

In regard to the question "When did the disease actually begin?" the standard selected is the period of supervention of inability to work at the regular employment. The patient's own statements as to the duration of his malady were also recorded. By this latter criterion the vast majority of patients had been ailing somewhere between three months and two years at the time of admission. As for the test of incapacitation from work, about 30 per cent. had never lost this capacity; of the remaining 70 per cent. the vast majority had given up their work in from one to six months before admission.

An attempt is made to show by statistics that a relationship exists between the dimensions of the individual and the tendency to haemoptysis. The claim which has been made to the effect that those who spit blood have a greater average height than other consumptives is not borne out by the present material.

The material was also investigated to test the truth or falsity of Brehmer's theory that in families with numerous children and healthy parentage, a spontaneous tendency to tuberculosis arises late in the series, beginning somewhere about the sixth child. Something of the same character is also seen in the younger children of families not necessarily numerous. The result of the analysis of the material of the "Krankenheim" for 1899 does not exactly bear out Brehmer's theory, although it shows that the maximum morbidity from tuberculosis occurs in the fifth and sixth children of a family. The number steadily increases from the first-born to the fifth and sixth and then as steadily declines, with one slight variation up to the thirteenth—after which the number is probably too small for statistical purposes. There are reasons which make it intelligible why late-born children might exhibit unusual morbidity. Such children are less carefully tended and reared, the parents have less vigor, the circumstances of the family become more straitened with each succeeding birth, etc.

We now arrive at the subject of treatment, which at the present time is conducted upon the following principles: Alternation between rest and exercise in pure air, and with suitable nourishment and good care of the skin and body, under constant control and instruction. Particular stress should be laid on the selection of cases suitable for lung gymnastics. Such exercises have secured uniformly favorable results, and in no individual case have they produced haemorrhage or any other sort of disturbance. Gymnastics, and especially pulmonary gymnastics,

must be regarded as a valuable remedy in the treatment of pulmonary tuberculosis.

Of 881 patients discharged from treatment in 1899, 672 had more or less expectoration, while in 209 cases, sputum was absent. Of the 672 patients with expectoration, 243 or 26.2 per cent. showed the presence of Koch's bacillus. It is evident, therefore, that a very large series of cases of closed tuberculosis was referred to the sanitarium. These patients do not necessarily have a better prognosis than those who expectorate, but the chances are more in their favor, because the latter cases represent on the average a later stage of the disease.

In all cases in which expectoration is absent and the clinical symptoms are ambiguous, the tuberculin-test should clinch the diagnosis. Neisser of Stettin is employing this resource in the cases referred to him from the Pomeranian Insurance Institute. A published report of results in this field of investigation is a desideratum. Meanwhile the experience of Petruschky encourages one strongly in the direction of further study along this line.

From a comparison of cases of "open" and "closed" tuberculosis referred to the Krankenhaus, the ratio of frequency is found to be 3 to 1; therefore the value ascribed by the government to the establishment of stations for testing sputum is scientific rather than practical. If one-third of the patients recruited for sanatoria have no sputum, the test must necessarily be valueless for this element.

In the majority of cases a patient with expectoration can no longer be regarded as in the initial stage of tuberculosis; and his treatment must extend over a period as long as his patience and the funds of the insurance company hold out.

The upper air-passages show a high degree of morbidity in pulmonary tuberculosis. No less than 25 per cent. exhibited signs of laryngitis and in about 4 per cent. the affection was tuberculous in character. Disease of the pharynx was present in 40 per cent., and intranasal disease in nearly as many. No single instance of nasal tuberculosis was present but the disease was localized in the tongue in one instance. Affections of the middle ear were very common.

Dry pleurisy, so common an accompaniment of tuberculosis, was present in 356 out of 881 cases. Fever coexisted in 222 patients. Profuse haemorrhage occurred in 48 individuals with two fatalities. There were 18 cases of pronounced emphysema and 47 of valvular lesions of the heart.

Exact statistics of the coexistence of neurasthenia with tuberculosis

were not formulated. This is a subject with which the future should concern itself. The same is true of diseases of the nerves, whether motor or sensory.

Particular attention was bestowed upon diseases peculiar to women. Information as to these affections is often suppressed by the patients out of diffidence, and it is important to determine the existence or non-existence of genital disorders in women, as the relief of affections of this type exerts a material influence upon the physical welfare of the patient.

Pregnancy beyond the third month excludes the patient from the sanitarium. Pregnant tuberculous women usually experience an exacerbation of their disease after delivery. It appears to be a good plan to send such patients to the sanitarium as soon after confinement as possible for this reason. This course should be of marked advantage to the child in case it survives.

The therapeutic results for 1899 are as follows: Absolute recovery is a classification which is not employed in this connection. Under the head "improved" there are no less than 740 patients or 84 per cent. "Unimproved" is represented by 12.5 per cent. Twenty-seven patients (3.1 per cent.) became worse under treatment and 4 (0.4 per cent.) died.

In regard to the capacity for work about 73 per cent. were discharged fully capable of earning their living, while 9 per cent. were partially capable. One hundred and fifty-four patients were discharged unable to work.

Statistics as to weight should have a relative significance in regard to results of treatment. It appears that the majority of patients gained 10 or 15 pounds while under treatment. Forty-seven individuals gained but two pounds; 74 gained 5 pounds; 96 about 7 pounds; 108, 9 pounds; 134 about 11 pounds; 81, 13 pounds; 85, 15 pounds; 58 nearly 18 pounds; 48, 20 pounds; 28, 22 pounds; etc. The record was made by a patient who gained 40 pounds. Three patients each gained 33 pounds.

Opposed to these figures are those which signify loss. Sixteen patients lost more or less flesh and two lost no less than 9 pounds each while under treatment.

Finally 78 patients or 5.2 per cent. underwent no change in weight.

The most important question in connection with sanitarium treatment is of course that which deals with permanent results. The Weicker sanitarium now has records in this particular which extend over five years. In 1900, 2500 cards of inquiry were sent out to former patients, and in all doubtful cases the insurance companies, civil authorities, etc.,

were called upon for aid, and in particular inquiry was directed to the attending physicians.

In the attempt to have as few exceptions as possible, many difficulties were encountered. Owing to the character of the people who come to the sanitarium it was often hard to obtain information, even with the aid of the police officers; and many patients were not inclined to make replies to the inquiries sent out. In fact the difficulties encountered were of such nature as to delay the publication of a report six months. The nature of the investigation was in itself a cause of error, as it was of course impossible to send out inquiries and obtain replies on a particular day. Those who failed to reply to the original letters of inquiry had to be looked up again at a later period. Ten or more letters may have been required to establish the fate of a particular patient. There were sources of confusion in regard to the matter of the return of the patient to work. Thus, suppose one patient leaves the sanitarium to resume his employment in January and another in the following December. At the end of the year the same letter is addressed to the two men as to their ability to work. It is a foregone conclusion that the man discharged in December is still able to work, while the other has been exposed for nearly a year to the possibly injurious effects of his occupation. Some months are unfavorable for statistics because of the likelihood that many people are out of work at that time of year. Future statistics will be compiled with reference to these and other sources of error.

The circular letter sent out January, 1900, had four principal questions, viz.: 1. Are you or are you not able to work? 2. Have you increased or decreased in weight and by how much? 3. Have you changed your original occupation? 4. What is the address of your attending physician?

As a result of the inquiries sent out for the year 1899, the following statistics were obtained: Percentage of those able to work, 63 per cent; partially able to work, 5.1 per cent; unable to work, 21.8 per cent.; dead, 10.1 per cent. These figures relate to the so-called "economical recovery" as distinguished from medical recovery.

If we compare with the preceding the figures obtained for patients discharged in 1898 we find that 45.6 per cent. are still able to work, 5.1 per cent. partly able, 16.3 per cent. unable and 33 per cent. dead. Of those discharged in 1897, 41.6 per cent. are still at work, 2.2 per cent. are partly able to work, 13.9 per cent. are unable to work, and 42.3 per cent. are dead. Of those discharged in 1896, 24.2 per cent. are still earn-

ing their living, 2.8 per cent. are partly able to work, 9.7 per cent. cannot work and 63.3 per cent. are dead.

Finally of the patients discharged in 1895, 22.9 per cent. are still at work, 9.8 per cent. are partly able to work, 9.8 per cent. are unable to work and 57.5 per cent. are dead.

As a general proposition it is true that as years go by the percentage of the discharged who are able to work becomes less, while the list of decedents constantly increases. But this statistical material deals with all cases, whether discharged to work or otherwise. If we now construct a statistical material limited to all those patients who were originally reported able to work when discharged, we obtain figures as to permanent results which are much more favorable than could have been expected. Thus of those discharged able to work in 1895, 48.3 per cent. were still able to work in 1899; of those discharged 1896, 40.8 per cent.; 1897, 61.1 per cent.; 1898, 64.1 per cent.; 1899, 76.9 per cent. The percentage of those partly able to work is also relatively high, while that of the dead is as follows: Of those able to work after discharge in 1895, 33.2 per cent. were dead in 1899; 1896, 45.6 per cent.; 1897, 22.2 per cent.; 1898, 14 per cent.; 1899, 3.1 per cent.

If the material of the "discharged-able-to-work" is restricted to individuals in the first stage of tuberculosis, statistics show that about 80 per cent. of such individuals continued to live and work during the observation period of five years.

In regard to the question "have you gained or lost in weight" as applied to the combined material of 1899, it was found that 19 per cent. had gained after leaving the sanitarium, 67.1 per cent. had lost, while in the others the weight remained unchanged.

An information blank is sent by the sanitarium management to the physician who is to examine the candidate for sanitarium treatment. No patient should be recommended who has emphysema or any complication of tuberculosis in other organs (larynx, middle-ear, ano-rectal region, etc.); constant fever, cavities, bilateral dullness on percussion, tendency to haemoptysis, cardiac weakness and dyspnoea all reject the applicant. Pregnant women are ineligible.

The information blank proper contains in addition to obvious questions, which bear upon the evolution of tuberculosis, queries directed to the length of the body, the position and condition of the heart, the possible coexistence of syphilis, diabetes, etc.

The blank in use after the patient has been admitted to the sanitarium contains provision for special information as to the family his-

tory of carcinoma, the prevailing diet of the patient, history as to abortions or premature deliveries in women, and history, etc., as to tuberculosis in other organs. The questions designed to cover the history of the first stage relate to presence or absence of pallor, weariness, loss of appetite, loss of weight, fever, night-sweats, pains, cough, dyspnoea, etc., etc. Especial inquiry is directed to the coexistence of syphilis, rheumatism, gout, diabetes and nervous diseases. Nearly every organ in the body is tested for the possible coexistence of tuberculous foci.

Finally the following are noted in parallel columns upon admission and discharge respectively: Measurements, expansion, pulse, respiration, urine, sputum, and weight.

REVIEW OF CURRENT LITERATURE.

A NEW CASE OF PRIMARY TUBERCULOSIS OF THE PAROTID.

Lecene (*Revue de Chirurgie*, April 10, 1901) emphasizes the great infrequency with which this affection occurs, his own observation raising the total to eight undisputed cases, with three others which are in doubt by reason of incomplete examination. Reporters of previous cases are Aievoli, Bockhorn, Stubenrauch, Legueu and Marien, Parent, Paoli and Küttner. The three doubtful cases were reported by Jayle (2) and Tripier. In Aievoli's case the submaxillary gland was also tuberculous, but in all the others the disease was limited to the parotid. All of this material has been reported since 1893.

The author's case is as follows: The patient was a man 29 years old, and entered the Cochin Hospital in November, 1900, for a tumor of the right parotid region. The growth was first noticed ten years before and was then of the size of a small nut, with its seat just beneath the lobule of the ear. It enlarged very slowly but continuously, so that two years before admission it had attained the size of a walnut. At that period it began to grow more rapidly, so that at the first consultation it formed a swelling of considerable size, moving freely under the skin, and in all directions. The superjacent skin was normal. Beneath, it was felt to be continuous with the parotid. Behind, it overlapped the anterior border of the sterno-mastoid. In front it passed the posterior branch of the ascending ramus of the lower jaw by a wide margin. It extended from the lobule of the ear above to a little beyond the chin below. There was no tenderness on pressure. The consistency of the mass was not everywhere the same, for at its anterior aspect there was a little softening and fluctuation. The patient appeared to be absolutely

free from other affections, and aside from a sister who had died of phthisis, no blood relative was known to have been consumptive. He had had mumps several years after the tumor first appeared. At the period at which the presence of the growth was first apparent patient was leading a healthy life on a farm, where he was not exposed to any known source of infection.

A diagnosis was made of "mixed tumor of the parotid" and the mass was immediately extirpated, the patient making an uneventful recovery.

Section of the tumor revealed no cystic or caseous focus. Its tuberculous nature was not surmised and hence no inoculations were practiced. Histological examination showed that the tumor represented the parotid gland, enlarged by abundant round cell infiltration, which evidently invaded the tissues from the periphery. The intact portion of the gland was but slightly altered. Here and there in the infiltrating embryonal tissue could be seen giant cells. For the first time the tuberculous nature of the growth was surmised and by appropriate staining a few of Koch's bacilli were brought to view.

Commenting on his and other cases the author speaks of the relative immunity of the salivary glands from tuberculous infection. While some of the reported observations appear to show that the infection extended along Steno's duct, the author's case was clearly of another type—either a haematogenous infection or an instance of primary invasion along the lymphatics. It is conceivable that tubercle bacilli may have accidentally contaminated the man's mouth. A slight ulceration near a tooth or infection of the pulp of a carious tooth may have been the initial manifestation, which is of a sort easily overlooked.

In the recorded material the reporters did not as a rule surmise the tuberculous nature of the glandular affection. The appearance of the patients and the rarity of the affection under consideration naturally lead to hesitancy in making a diagnosis. In Leguen's case the tuberculous nature of the lesion was correctly surmised, but the parotid was not thought to be implicated in the process which was regarded as an adenitis. In Küttner's case and likewise in Bockhorn's the presence of a fistula with a characteristic discharge facilitated the making of a diagnosis. The fact must not be overlooked that the parotid lymphatics might readily become tuberculous. As a matter of observation these glands are likely to become affected when the parotid is the seat of tuberculosis.

ASCENDING AND DESCENDING TUBERCULOSIS OF THE KIDNEY.

Pousson (*Le Bulletin Médical*, May 29, 1901) in the course of a clinical lecture on this subject at the University of Bordeaux called attention to the apparent freedom from tuberculosis of a man aged 44 who had presented himself for treatment for vesical irritability dating back seven months. The urine retained its natural appearance, save for the fact that a few drops of blood would sometimes come away during micturition.

These vesical disturbances were followed by loss of appetite, with some weakness and emaciation. An indolent swelling of the right testicle also appeared. Despite these symptoms the patient went about his work as usual.

Not long before seeking treatment a new symptom was ushered in, to wit, backache of a severe type, limited to the right lumbar region. The patient ascribed this in part to his occupation as driver of a milk wagon.

Examination shows that the right epididymis is swollen, indurated and nodular. The corresponding spermatic cord is normal. Palpation of the bladder does not provoke that tremor of the facial muscles which occurs when a cystitic bladder is manipulated. Palpation over the right ureter along Halle's line reveals a tender spot where this structure crosses the superior strait. The finger, forced inwards at the outer margin of the rectus, appears to make out the existence of a ureteritis and periureteritis. The condition should correspond to Halle's second type of ureteritis, characterized by elongation, tortuousness, nodular eminences, etc., a condition known to complicate renal tuberculosis, which latter affection is already under suspicion in the present case.

The next step to undertake is palpation of the right kidney and a tumor in this locality is readily made out. Renal ballottement, as practiced first by Guyon, confirms the diagnosis of a tumor of the kidney. The rectal touch now shows that the prostate is intact on its left side, as is the left seminal vesicle. The right lobe and vesical, however, are enlarged, indurated and nodular.

A provisional diagnosis is now made of ascending urogenital tuberculosis beginning at the epididymis and successively involving the bladder, prostate, ureter and kidney of the same side.

A bulbous sound is now made to enter the urethra, which is patent as high up as its membranous portion. The absence of anterior urethritis is not surprising. The obstruction in the deep urethra is shown to be spasmodic, for when the perineal muscles are relaxed by posture, the

sound readily enters the bladder (the posture consists in sitting up in bed and strongly flexing the trunk forward).

With the sound in the bladder it is easy to demonstrate that cystitis is absent. As much as 400 grams of boric solution were injected without causing contraction of the bladder.

Uroscopy shows slight polyuria, with turbid, milky urine which does not clear up on standing. The reaction is acid. The excretion of urea is reduced to at least one-half the normal. Albumin is present in traces only. The microscope reveals numerous leucocytes and epithelia from ureter and pelvis of the kidney. Blood corpuscles and renal epithelia are wanting. Finally Koch's bacillus was found in the midst of a variety of other bacteria.

In renal tuberculosis the bacillus may reach the organ by the haematogenous route or by propagation along the ureter. Authorities differ completely as to which of these two is the classical type, because the diagnosis of urogenital tuberculosis is seldom made until it has ascended or descended extensively. This problem in diagnosis is usually decided by the presence or absence of three classes of symptoms. Haematogenous renal tuberculosis is usually announced by intense pains. These early sensations, which are often nocturnal, may simulate the pain of renal colic in various particulars, but are less severe. Tuffier demonstrated that most of the cases of painful renal tuberculosis were of haematogenous origin.

The second symptom refers to cystalgia, vesical irritability, vesical reflexes, etc., which were but slightly marked in the author's case, but which are believed to characterize, when marked, the haematogenous variety of renal tuberculosis.

The third symptom is haematuria, which is very common in haematogenous tuberculosis. Since it was practically absent in the author's case; since the painful symptoms referable to the bladder were likewise present in a very mild degree, and finally, since the lumbar pain was not precocious, but appeared only after the evolution of other symptoms, it is highly probable that the diagnosis of ascending tuberculosis was correct.

As for treatment, the disease was too far advanced for extirpation of the kidney, and the author contented himself with cutting down on the organ and excising a caseous focus.

TUBERCULOUS TUMORS OF THE LARYNX.

Trautmann (*Arch. f. Laryngologie*, XII., No. 1) states that the tuberculous affections of the larynx comprise the infiltration, ulcer and tumor, and miliary tubercles. The tumor is by no means a rare affection and does not preserve a uniformity of type, there being at least three varieties. The first occurs in any portion of the larynx, and is associated with tuberculous laryngitis. Bacilli and giant cells are not present, but the growth is inoculable to animals. These tumors seldom or never ulcerate, and when removed are usually prompt to recur. The entire course is chronic. The second type is the pseudo-polypus, which is almost necessarily associated with tuberculosis of the lungs. It is seldom or never accompanied by local infiltration and ulceration. Pathognomonic of this form of laryngeal tumor is the appearance upon the interarytenoid fold of certain irregular elevations. The third form of laryngeal tumor appears to be wholly primary. In a case reported by Panzer the evolution was perhaps as follows: The patient had at the outset some simple polypoid hypertrophy of the left vocal cord. Four months later a tuberculous tumor occupied the seat of the polypus. The only explanation of this phenomenon is found in the possibility that an attempt to extirpate this benign growth had paved the way for its infection by the bacillus. A number of authors have reported cases of tuberculous tumors, in which the lungs gave every evidence of being intact. Nevertheless, the tuberculous tumor is usually secondary. The author has been able to trace the history of the tuberculous tumor in literature as far back as 1866. Many of the earlier cases, however, are not beyond suspicion of belonging to some other type of tuberculous laryngitis, hence the author prefers to include only such tumors as have been reported since 1882. From a close study of recorded material and personal cases, his conclusions are as follows:

Primary tuberculous laryngeal tumor may constitute the initial lesion of tuberculosis; the disease may take its origin here as well as in the lungs, bones and lymph ganglia. The possibility of infection from without must be taken for granted, as must likewise the haematogenous origin. Since the disease may often be eliminated by destroying the primary focus, the earliest possible operation for removal of the growth is indicated. These tumors are not of very rare occurrence. They are prone to affect the youthful, and cause no pain, but alter the voice. Their usual seat is the ventricle of the larynx, beneath the angle of the glottis, on the posterior wall. Pulmonary lesions may be present or they may develop at a later period.

To the naked eye these tumors resemble carcinoma, fibroma or other forms of neoplasin; but they differ from all of them in maintaining an intact surface, which is not affected by ulceration. They have nothing in common with the proliferation which takes place from a tuberculous ulcer.

The diagnosis can hardly be made with certainty without the microscope. Sections must be obtained from all portions of the tumor and be examined by an expert who can distinguish between what is essential and what is accidental.

These tumors are not necessarily malignant. When removed a certain amount of improvement is often noted, and brilliant successes are not unknown.

ACCIDENTAL ROLE OF PLANTS IN THE TRANSMISSION OF TUBERCULOSIS FROM MAN TO ANIMALS.

Cliquet, a veterinary practitioner, contributes an article with the above title to *La Lutte Antituberculeuse* (formerly *L'Oeuvre Antituberculeuse*), May 31, 1900, emphasizes the readiness with which mankind and the lower animals contaminate each other with tuberculosis. In the great majority of cases contamination of this character is due to imprudence and therefore readily preventable. The human being expectorates everywhere and thereby infects the dust of the street and vegetation of the fields which transmit the disease to the domestic animals.

Recently the writer was called to examine a milch cow aged 12 years, which had begun to show signs of weakness. The symptom-complex was that of bovine tuberculosis, and it was found that the dairy maid was a phthisical subject who spat constantly on the ground.

An injection of tuberculin gave an initial reaction of 37.8° C., and a maximum of 39.9° C. was reached at the 17th hour. The animal was clearly tuberculous and was slaughtered. Autopsy confirmed the diagnosis.

The rest of the herd were still healthy and the cow was of sound parentage. The sputum of the dairy-maid taken from the ground was inoculated successfully into guinea pigs.

All tuberculous farm and dairy hands should therefore be instructed not to spit upon the ground or the vegetation, especially if the latter furnishes the food for any of the domestic animals.

FERRAN'S SPERMIGENIC BACILLUS AND ITS ROLE IN TUBERCULOSIS.

Duhourcau (*La Tuberculose Infantile*, April 15, 1901) reviews a recently published article of Ferran of Barcelona and expresses the opinion that it has considerable practical significance. The tenor of the article in question is as follows:

The hope of a prophylactic vaccination for tuberculosis has come to naught, as has the corresponding quest of an antidotal serum to cure the disease. These failures are due to our incomplete knowledge of the bacillus which produces the toxins.

In the sputum of the tuberculous the bacillus of Koch exists in abundance, but side by side with it and even preceding it chronologically there is another tuberculogenous bacillus easily cultivated which has tinctorial qualities differing materially from those of the Koch germ. This new bacillus occurs in several different forms, one of which under definite circumstances is able to produce a dialyzable substance having an odor like that of human semen, and giving the reactions which, according to Poehl, are characteristic of semen. Further it exhibits the form and chemical functions of the bacillus coli. Virulent cultures prepared in normal serum or Martin's bouillon, produce when injected beneath the skin of a guinea pig an extensive haemorrhagic oedema which quickly becomes fatal.

Serial inoculations from this oedema show that the virulence of the culture is due to a preformed toxin.

Such guinea pigs as do not rapidly succumb to the toxin of the culture ultimately develop tubercles in more or less discreet arrangement in those tissues which were the seat of the original inflammatory oedema—especially the spleen, liver and lungs. The tubercles are, in fact, invariably preceded by this condition of phlegmasia. When the ordinary bacillus coli, isolated from human excrement, is cultivated and inoculated into guinea pigs it produces the same fatal inflammatory oedema. Propagated in a numerous series by inoculation the bacillus coli becomes transformed into Koch's bacillus.

This new germ or phase of germ-life is styled by Ferran the phthisiogenous or spermigenic bacillus. Koch's bacillus may also be cultivated back to the spermigenic bacillus in appropriate media and under particular circumstances.

Ferran concludes that the Koch germ is a bacillus coli which has developed a special virulence. He regards the latter as the sole cause of

phthisis and believes that immunizing and curative substances may be obtained from it.

[While Ferran seems to have spent a number of years upon these researches, we would hardly care to seriously consider, much less to accept, his theories and conclusions without more evidence than he gives in his paper; for the present we await the actual demonstration of the evolution of Koch's bacillus from the bacillus coli and its reversion to that type.—Editor.]

VACCINAL LUPUS.

This subject has been exhaustively considered in all its aspects by Dr. Little in the *British Journal of Dermatology* for March, 1901.

The author has had the opportunity of studying one case, and appends a sketch of all the other recorded observations with an analysis and conclusions.

Less than a dozen cases are to be found in literature in which tuberculosis appeared to have been transmitted by the act of vaccination, with production of a lesion *in situ*. Generally speaking, the evidence in this sort of occurrence is far from complete, and especially so in regard to the element of confrontation, nor is there anything on record to show that the tubercle bacillus ever passed from an infected calf into the vaccine virus and thence into the tissues of the vaccinated individual.

In a number of cases there has been no more than a history of the sequence of vaccination and lupus *in situ*, dating back to infancy, the patients being adolescents or adults when their condition first came under the reporters' notice. In a few others the beginning of the lupus could be studied in relation to the recent vaccination-scar. One of the former is the author's own case, which is briefly as follows: The child, a girl, was vaccinated when four or five months old. The lymph was from a trustworthy house. Other children were vaccinated from the same lot of virus, but unfortunately they could not be traced after the delay incidental to the development of the lupus.

The child's parents were apparently free from any suspicion of a tuberculous ailment, and the same is true of four other children in the family. The fifth child, eighteen months older than the patient, died at the age of three years of pulmonary tuberculosis. The patient herself was healthy both before and after vaccination, as least as far as any suspicion of tuberculosis was concerned.

The calf from which the virus was taken was slaughtered eventually, but was not examined for tuberculous lesions.

The account of the development of lupus in the vaccination-scars was given by the father to the author, (patient did not come under the observation of a dermatologist until she was nine years old). The vaccination was performed in four places. The upper two pustules apparently ran a normal course and the scabs dropped off in three weeks. The others never underwent healing but became transformed into fungous, readily bleeding lesions, persisting throughout until the child finally came under observation. A purulent discharge had accompanied the lesions up to a year or so before the child came under Little's observation.

The patient was shown before the London Dermatological Society, January, 1900. The upper two vaccination-scars were intact and healthy. The site of the lower two scars is occupied by a large patch of lupus-tissue, measuring $2\frac{1}{2} \times 1\frac{1}{2}$ inches, with a few outlying nodules of recent extension. The axillary glands of that side were enlarged moderately and were hard and shot-like; this form of adenopathy is said to be characteristic of lupus.

The new-formed tissue was immediately excised, and during the year which has since elapsed there has been no reappearance of the disease.

Histological examination furnished abundant evidence of the tuberculous character of the lesion, and while no bacilli were found in the tissues the animal experiment was successful; guinea pigs inoculated with bits of the lupous tissue developed numerous caseating lymphomata which swarmed with bacilli.

Despite the lack of direct proof of transmission in cases of this sort, a study of inoculation-tuberculosis shows that there is nothing impossible in transmission by the act of vaccination, which could occur either through infected virus, infected instruments or subsequent secondary inoculation of the vaccination pustules. The author appears to believe that tuberculosis was really transmitted in his and similar cases, and that the virus itself must be held responsible, as having proceeded from tuberculous heifers. However he naturally leaves this question *sub judice*.

PRIMARY ACTION OF THE TUBERCLE BACILLUS UPON THE TISSUES.

Wechsberg (*Beträge zur pathol. Anatomie und zur allgemeinen Pathologie*, Bd., XXIX., No. 2) after a historical sketch of this subject sums up our present knowledge as follows:

There are at present two opposed parties, with views more or less sharply contrasted. Upon one side we find Baumgarten and his partisans and on the other Metschnikoff and his pupils. The two sides agree on recognizing the tubercle bacillus as the agency which produces—either in itself or through its toxins—the irritation which transforms the fixed or migratory connective tissue corpuscles into the epitheloid cells.

The differences in the views of the two hostile camps may be stated as follows: Metschnikoff holds that at the onset of tuberculosis, polynuclear leucocytes emigrate from the blood and overpower the tubercle bacilli, although this phenomenon does not protect the organism in any way. The real antagonist of the bacillus is the macrophagus—a large, mononuclear phagocyte. This corpuscle is said to come from the blood and to become changed to an epitheloid cell with large nucleus.

Baumgarten, on the other hand, denies that the polynuclear leucocyte plays any important part in the process under consideration, and asserts that the epitheloid cell with large nucleus proceeds from a fixed and not a migratory cell.

There can be no doubt of the existence of multiplication of cells at the onset of tuberculous invasion; this is evident from the mitoses which have been seen in this connection.

The problem which calls for solution is this: Does the proliferation of the fixed tissue-cells, which we may regard as destined to become epitheloid cells, entail any sort of damage to the tissues interested?

This problem was attacked by the author in a series of animal experiments in which the iris and lung were especially studied.

His first conclusion was as follows: The initial action of the bacillus is of the nature of an injury to the tissues, in this way—that the old, sessile tissue-elements, such as endothelia, alveolar epithelia, iris-epithelia, are destroyed; while the adjacent connective-tissue intermediate substance, whether collagenous or elastic, is likewise destroyed.

Does the irritation of the bacillus have any formative or productive influence? This question may be answered in the negative. Notwithstanding the number of young connective-tissue cells in the tubercle, little or no connective-tissue is formed.

The tubercle bacillus, which destroys by its toxins the adjacent

sessile cells and intermediate substance, may then be said to spare the newly formed brood of cells, while preventing any new formation of connective-tissue and blood vessels. These new cells are eventually destroyed by caseation.

ON THE QUESTION OF MIXED INFECTION IN PULMONARY TUBERCULOSIS.

von Weismayr (*Zeitschr. f. Heil-Kunde*, May, 1901) speaks of the as yet unsolved problem of mixed infection, secondary infection or symbiosis in the course of tuberculosis. To make headway in this field we must endeavor to find some way of harmonizing the various differences of opinion which exist at the present day. There is no better way to accomplish this end than a study of a great number of individual cases. The author who is director of the Alland Sanitarium has enjoyed ample opportunities for study in this field. For obvious reasons he has investigated such cases as go from bad to worse despite treatment, either dying in the sanitarium or discharged uncured.

The method pursued was invariably the same for each case. In the morning the patients rinsed the mouth with solution of potassium permanganate before expectoration. Sputum was then coughed up with unusual force and projected at once into a receptacle without any retention in the mouth. The vessel, previously sterilized, was protected from access of air by a cotton plug.

It is of course an essential in the study of mixed infection to exclude the possibility of entrance into the sputum of germs from any portion of the upper air passages and mouth. Hence the expectorated matter is washed in the following manner: It is first transferred to another receptacle by means of a platinum needle which has been freshly sterilized. The second vessel which contains sterile salt-solution, is agitated in such manner that all bacterial impurities which adhere to the sputum-balls after their expulsion from the lungs are mechanically removed. The washing process is repeated until the washings become sterile.

The sputum is now fit for study and plate cultures are made with agar, while cover-glass specimens are prepared and stained.

One hundred preparations of sputum from 81 patients were submitted to exact bacteriological study. The findings were invariably compared with the clinical type of the malady.

The material is grouped as follows: 1. Pure tuberculous infection

without any admixture of germs, 35 cases. 2. Mixed infection with streptococcus pyogenes, 20 cases. 3. Mixed infection with staphylococcus pyogenes aureus and albus, 13 cases. 4. Mixed infection with both staphylo- and streptococcus, 10 cases. 5. Mixed infection with miscellaneous germs (micrococcus tetragenes, diplococcus pneumoniae, bacillus Friedlander) 3 cases.

A study of the clinical features of the members of each of these groups:

Pure tuberculosis. But 2 out of 35 cases exhibited fever, while 2 had acute pleurisy. Nearly all the cases in this group terminated favorably, 29 having apparently recovered with 3 improved and one still under treatment.

Mixed streptococcus infection. Of the 20 cases in this group 14 had fever, 6 had laryngeal tuberculosis and there was one case each of pneumo-thorax, pneumonia and intestinal tuberculosis. As for ultimate results, 5 patients improved (3 of them decidedly), 9 were unimproved, and 2 died, 3 still remaining under treatment.

Mixed staphylococcus infection. Of the 13 cases in this group 6 had fever, 3 laryngeal tuberculosis, 2 pleurisy, and one pneumo-thorax. As to ultimate results 7 cases were essentially benefited, 2 were unimproved, 3 died, and one is still under treatment.

Mixed staphylo- and streptococcus infection. The 10 cases in this group include 2 cases with fever, 2 with pleurisy and 2 with laryngeal tuberculosis. Three patients were benefited (one materially), and 7 were unimproved.

The cases in the fifth group were all of a severe type.

The author draws the following conclusions from the foregoing research:

1. There can be no doubt that a majority of all cases of tuberculosis represent a mixture of infection. In typical phthisis we must especially suspect the presence of such mixture.

2. The commoner participants in the secondary infection are the strepto- and staphylococci, alone or combined.

3. All the germs which figure in these secondary infections exert a powerful influence over the course of the disease, especially in regard to the formation of cavities. Sometimes fever seems to be produced by the secondary infection.

4. Prognosis is worse in cases with mixed infection.

5. Special investigation should be conducted to determine whether

disease with succeeding exacerbations. Delirium, rare in ordinary phthisis, is very common in the alcoholic form. Women drink less than men but are more prone to take essences, etc., which are held to be especially dangerous.

The favorite drinks of the phthisical alcoholics appear to have been as follows: Essences alone, 239; essences with spirits, 254; essences, spirits and wine, 388. Spirits alone were used by 91 individuals and wine alone by 164. It therefore appears that essences (absinthe and the like) are by far the most dangerous of drinks from the standpoint of the contraction of phthisis.

Alcoholic phthisis appears to begin at a later period of life than the ordinary type and is at its worst in the forties.

Sedentary tuberculosis occurs with considerably greater frequency in men. No one occupation appears to have exerted any overwhelming influence toward the development of phthisis. In the sedentary, the disease begins with far greater frequency in the *left* apex, the reverse being the case in the victim of alcoholic phthisis. This may be due to the known functional inferiority of this portion of the lung in those of sedentary life. Careful study of the course of these cases does not show any special type or characteristics. Some of them are evolved insidiously. Lancereaux appears to believe that alcoholic phthisis has superseded the older type which was the product of mal-hygiene, and he explains this fact by a change in the laws which regulate the liquor trade, which was made in 1880, after which period the consumption of spirits, essences, etc., began to increase rapidly. To a certain extent, then, alcoholic phthisis is a new type, while the sedentary and malhygienic type is the traditional form of phthisis and as such merits no special discussion at the present time.

Contagion in tuberculosis is especially difficult to demonstrate in Paris. Country practitioners have long admitted the contagiousness of the disease, although this etiological factor was discredited in Paris until after the publication of Vellemin's writings. Lancereaux believes that the dangers from contagion are greatly exaggerated. Out of his 2192 patients there were but 182 who had been exposed to another case in the same family; but it would not be fair to regard all these cases as examples of contagion, for 64 of the 182 were alcoholics and 68 lived under very poor hygienic conditions. This leaves 50 cases in which these etiological elements were absent, and which give a presumption in favor of contagion, although Lancereaux believes so strongly in pregnancy as a

determining cause of phthisis that he deducts four cases in which gravidity preceded the evolution of the disease.

Of the 46 cases in which contagion was doubtless the sole etiological factor, 30 occurred in the husbands or wives of subjects of consumption; 5 cases appear to have been transmitted from father to daughter, 8 between brothers and sisters, and 3 between comrades. As a general proposition it may be said that the person who transmitted the disease inhabited a small chamber, while the one who contracted the disease spent much time in the said room, in the exercise of caring for the patient.

In regard to the part played by heredity alone, 420 of the 2192 patients descended from a tuberculous parent or had uncles and aunts who were consumptives. But it would not be proper to regard all these cases as examples of pure heredity, for there were among the total number 137 alcoholics, 160 people leading sedentary or unhygienic lives, 18 pregnant women and 12 cases in which the history justified a suspicion of contagion.

Generally speaking, tuberculous inheritance appears to be rare. As in the case of inherited syphilis, this form of tuberculosis tends to appear during the period of growth, of adolescence. Supposed hereditary cases which develop after the age of 35 or 40 should be viewed with suspicion. Contagion likewise occurs very infrequently and we are justified in looking upon alcoholism on the one hand, and malhygiene, poverty and sedentarism on the other as the two principal determining factors in phthisis. In both these clinical forms the disease begins with a loss of appetite with resulting denutrition, the consequence of the action of the alcohol and malhygiene. This state of denutrition paves the way for the development of the bacillus.

What can be done toward the destruction of the bacillus? It is folly to hope to exterminate it, for the germ is everywhere, even upon the summit of the San Luis Potosi mountains, 16,000 feet above sea-level. A vigilant asepsis may keep the bacillus in check, but if we confined our efforts to this line of prophylaxis alone, the writer believes that the germ would still be able to increase year by year.

Practically the problem becomes involved in the combating of the abuses of the liquor trade, and in the securing of better hygiene.

ON THE COURSE AND CURABILITY OF PERITONEAL TUBERCULOSIS WITHOUT LAPAROTOMY.

Rose (*Mittheil. a. d. Grenzgebieten. d. Med. u. Chirurgie*, VIII., 1-2) gives this subject a most exhaustive discussion. Much depends upon a correct diagnosis under such circumstances, because the physician—unlike the surgeon—has no means of verifying his diagnosis during life. We learn from the surgeons that the disease occurs with much greater frequency than has been believed. When we suspect its presence we are usually correct in our suspicions, and the disease frequently occurs when we have not surmised its existence.

Diffuse peritonitis and ascites may be confounded with tuberculous peritonitis under the following circumstances:

1. The tuberculous peritonitis which supervenes insidiously with the picture of ascites is often difficult to distinguish from cirrhosis of the liver, and the occasional coincidence of the two affections also tends to complicate the diagnosis.

2. The tumor-like form of tuberculous peritonitis, with or without ascites, is often difficult to distinguish from carcinosis of the peritoneum.

3. Ascites occasionally develop—especially in children—after infectious diseases, such as measles and typhoid fever. These cases may have a tuberculous character.

4. There is a peculiar form of ascites seen in young girls at the period of development, which occurs idiopathically as far as any disease-element is concerned, and is dependent in some way upon the genitals. Sometimes the first menstruation causes the effusion to disappear spontaneously.

5. There is a form of chronic exudative peritonitis of traumatic origin, not necessarily tuberculous.

6. There is a form of non-tuberculous chronic inflammation of the peritoneum connected with a peculiar condition of the liver—so called “Zuckergussleber.” The nature of this affection is entirely obscure. It is eminently chronic, practically stationary and hardly recognizable during life. But this affection—sometimes known as Curschman’s disease—is extremely rare as compared with tuberculous peritonitis.

7. After considering all the foregoing forms of peritonitis, there is still a residue of cases which may be termed “simple” or “idiopathic” peritonitis; but possibly cases of this type are really tuberculous.

In any case such simple or idiopathic peritonitis, if it exists, is excessively infrequent, as will appear from the following retrospect:

During the period 1886-1900 there were but four cases at the

Medical Clinic at Strasburg which could be regarded as non-tuberculous exudative peritonitis.

From another point of view, that of autopsy, it appears that of 165 cases of peritonitis recognized *post mortem*, all were tuberculous save a few which had been due to propagation from neighboring organs (uterus, intestine). Statistics from other clinics give similar data.

In regard to the difficulty in diagnosis, we have several resources which may be tried. The aspirated contents of the peritoneal cavity may be injected intra-abdominally into guinea pigs. This method served to establish a diagnosis in two of the author's cases. This test, however, is by no means infallible, for the peritoneal effusion is not always infectious.

In doubtful cases Nothnagel recommends the injection of tuberculin; while the diazo-reaction of Ehrlich has once more come into prominence as a prognostic resource. But the author has seen cases of tuberculous peritonitis recover after exhibiting the diazo-reacton.

A general survey of the literature of this disease from the standpoint of internal medicine teaches that the great majority of cases treated without laparotomy have gone on to a lethal termination despite intervals of apparent rest and cure. The few instances of exceptional results do not rest upon a substratum of facts and statistics, but rather upon the impression created in the mind of the clinician.

Thus far the author has concerned himself with the labors of others. He next considers his personal material—some fifty cases all told and after a careful analysis finds that if a patient does not recover within a year and a half or two years, he will not recover at all, this rule holding good as a general proposition, subject to exceptions. Generally speaking, about one-third of all cases treated by medical measures only, will recover. This proportion of recoveries is higher than that given by König some ten years ago for cases treated by laparotomy (twenty-five per cent.); but other operators, and also König himself, have subsequently published much more favorable figures for the results of laparotomy.

On the other hand, within a very short period Barchgreonik has published facts in connection with non-surgical treatment which place that method once more in the ascendant, he claiming no less than sixty-eight per cent. of spontaneous recoveries under the expectant plan.

We must therefore admit that the question of superiority between the expectant and surgical methods is as yet by no means decided.

ON THE TREATMENT OF PULMONARY TUBERCULOSIS WITH TUBERCULIN.

Dr. Goetsch (*Deutsche med. Wochenschrift*, No. 25, 1901) reports his experience with this remedy in 175 cases of pulmonary tuberculosis which he treated in the hospital of Slawentzitz, O. S., within the last ten years.

The author, having referred to the general disappointment of the profession as well as of the laity, at the failure of Koch's tuberculin, in '90 and '91, to fulfill their hopes and expectations, proceeds to enumerate the causes for the injurious effects resulting from the use of the remedy at that time.

He says:—"Tuberculin is a powerfully acting remedy; its effects on patients were not sufficiently studied at that time. No selection of cases was made, but the remedy was injected without making a regular temperature record, and without weighing the patients. If the fever increased, the doses of tuberculin were increased in order to drive away the former, just as one gives quinine in malaria. If then the patients became worse tuberculin was given the blame."

When called in consultation the author's colleagues complained that in spite of steadily increased doses of tuberculin the fever continued to increase also.

Dr. Goetsch concluded that it was not right that increase of fever should follow doses increased twice or thrice weekly, and consequently he began with the smallest doses and to increase very slowly and cautiously. Thus patients treated by him in 1891 escaped the dangers of the tuberculin cure, finally lost their tubercle bacilli and regained their health.

Dr. Goetsch makes the diagnosis of tuberculosis if tubercle bacilli are demonstrated, if the build and general condition are suggestive and if to the test injection of tuberculin the patient reacts with increased temperature.

In 1891 he treated nine cases; since '91, 224. From this number twelve are to be subtracted who either remained but a short time, or in whom, on account of far advanced stages, the tuberculin cure could not be carried out.

At the present time 37 are under treatment, so that in all 175 may be counted who were discharged after at least four weeks of treatment.

Of the 175, 125 are considered cured, i. e., 71 per cent; the remaining 50 patients have for the most part interrupted the cure from time to time, so that only an improvement and not a cure can be claimed.

Of the 225, 88 had tubercle bacilli in the sputum; in one case tubercle bacilli were demonstrated in suppurating cervical lymph glands. One hundred and thirty-five reacted promptly to the tuberculin injections.

The average duration of the cure was, in 125 cases, 198 days—the minimum 50 days, the maximum 791 days.

If the cases of bone, joint, glandular and skin tuberculosis be excepted and if only those of pulmonary disease be considered, the average duration of the cure was 143 days. The gain in weight varied from 8 to 40 pounds, the average gain was 19 pounds.

The majority of cured patients are still in communication with the institution and are from time to time received for the purpose of examination of general health, of sputum, and of making trial injections.

An exact history of each patient is recorded; charts showing lung conditions and records of weekly weight, temperature (morning, noon and evening) and dosage are kept.

Injections are given twice a week. In connection with the specific treatment dietetic and hygienic measures are employed in order to accelerate the cure.

As the first principle of the tuberculin treatment the author has always insisted that no patients with fever should receive injections. In such patients the temperature is first reduced by rest in bed, packing, etc. If this is not successful, they are not considered eligible for the cure. New patients are thoroughly examined in all respects in order to determine if the general condition of strength and resistance is sufficient and if the changes in the lungs are too far advanced to offer a favorable prospect of cure.

The initial dose is usually 0.0001 g. of old tuberculin. If elevation of temperature results the dose is reduced to 0.00001 g.; if this is not tolerated T. R. (Koch's new tuberculin) is employed which is generally given in the dose of 0.001 m. g. which is usually borne very well and is successfully employed as preliminary to the old tuberculin. As soon as 0.1 mg. of T. R. is reached, from 0.0001 to 0.001 of old tuberculin is injected and well tolerated. By a gradual increase it is possible to reach a dose of 1.0 g. of old tuberculin; at this time the cure is complete, while the tubercle bacilli and cough have vanished as well as the expectoration in most instances, weight has become normal and physical signs, as far as is possible, have disappeared.

Such success may be accomplished without danger to the patient only when the dose is not increased until the last dose has produced no reaction.

Dr. Goetsch considers it imperative, especially in the beginning of the cure, that the patients should remain in bed, during the day of injection and the following day, in order that a fever reaction may be with greater certainty avoided.

The author gives histories and tabulations showing method of increasing dosage, temperature records and weights, in a number of cases.

The author published his experience at the suggestion of Professor R. Koch, and the following note by Professor Koch is appended:

"Most physicians are of the opinion that the specific treatment of pulmonary tuberculosis, especially with tuberculin, is useless and moreover dangerous..

"This erroneous opinion arose from the frequent use of the remedy in cases in which the disease was no longer of a purely tuberculous character, but in which suppuration was a complication. In such cases the specific action of the remedy can not assert itself. All physicians who have had considerable experience with tuberculin treatment and have published the same (Spengler, Turban, Petruschky, Krause, Thorner, Heron, Rembold, Baudelier) assert that, if the treatment is restricted to purely tuberculous and not too far advanced cases, that is to say non-febrile cases of pulmonary tuberculosis, the influence of the remedy is favorable without exception.

"In this I concur, and there is now a consensus of opinion that it is best to avoid all marked reactions—Dr. Goetsch has gone even further in this respect by seeking to avoid reactions altogether, and has nevertheless reached large doses in the end. By this method he has attained especially good results of which I have personally satisfied myself in the hospital at Slawentzitz.

"To induce other physicians to make similar efforts, at my suggestion Dr. Goetsch determined to publish his results."

The foregoing paper elicited the following editorial in the *Journal of the American Medical Association* of July 3rd.

TUBERCULIN.

"The furor excited among physicians and laity, in 1890, by the announcement that Koch, the discoverer of the tubercle bacillus, had also discovered in tuberculin a cure for tuberculosis, will not soon be forgotten. The disappointment, not to say disgust, that followed when Virchow and others proclaimed the dangers attending the use of the new remedy, will likewise long be remembered. Physicians and laity feared

to employ the remedy, and it was generally discarded. A very few used it cautiously for the purpose of diagnosis. A still smaller number, including several Americans, employed it as a curative agent. Among these was Goetsch, of Slawentzitz, who now, at the end of ten years, and at the solicitation of Koch, publishes his statistics (1): He tells us in plain and simple language, having the ring of honesty and scientific accuracy, that from 1890 to 1900 he has treated 175 cases of tuberculosis with Koch's tuberculin with a percentage of cure of 71; that is, 125 have been cured and 50 improved. The record is startling, even when we consider that his cases are carefully selected ones, where the process is not far advanced, and where mixed infection has presumably not occurred.

Goetsch makes his diagnosis by the history and physical signs, but has called no case tuberculous unless tubercle bacilli have been found, or unless there is an unmistakable reaction to tuberculin; and he calls no case cured unless bacilli disappear, and the patient tolerates without reaction a large dose, even up to one gram, of the old tuberculin.

He lays down three rules that should be followed:

1. The treatment should only be begun when the patient is free from fever.
2. The dose should not be increased until the last dose is tolerated without reaction.
3. The patient, on the day of the injection, as well as on the day following, must remain in bed.

His illustrative cases seem convincing, and those who have all along hoped that in tuberculin there was an agent that, rightly employed, might rank with quinine and diphtheria antitoxin as a specific, will again take courage from this contribution to the subject, and will await eagerly for confirmation from other quarters of the remarkable results reported by Goetsch. For, as said before, even granting that he selects only the favorable cases, the incipient ones, the results seem marvelous and, if supported by other investigators, will go far toward restoring to favor the despised tuberculin."

BOOK REVIEWS.

THE INTERNATIONAL MEDICAL ANNUAL, A YEAR BOOK OF TREATMENT AND PRACTITIONER'S INDEX. Nineteenth year. New York: E. B. Treat & Co. \$3.00.

The general profession is so well acquainted with this publication that an introduction is unnecessary. With its staff of learned contributors, the books could hardly be otherwise than valuable.

(1) Deut. med. Wochenschrift, June 20, 1901.

or not laryngeal tuberculosis stands in some etiological relation to mixed infection. In every case of laryngeal localization in the author's material mixed infection coexisted.

6. The result of the author's studies has not harmonized the opposite views of some of his colleagues but further work should be done along the lines here laid down.

THE SIGNIFICANCE OF MIXED INFECTION IN THE CLINICAL PHENOMENA AND COURSE OF TUBERCULOSIS.

Sata, the Japanese scientist, who is known as an authority upon the subject of mixed infection in phthisis, contributes an article upon this theme in the *Zeitschrift für Tuberculose und Heilstättenwesen*, March 1901.

He begins with the query: "Why should pulmonary tuberculosis be such a fatal affection (for most of the mortality from tuberculosis is due to its pulmonary localization)?"

The mere formation of tubercles is not a pernicious process and is often accompanied by a tendency to spontaneous recovery, as Sata has been able to demonstrate histologically. Pulmonary phthisis does not overthrow the function of the lungs and thus compromise life. These organs, in withstanding severe attacks of pneumonia, show a degree of natural resistance which is not menaced by a disease like tuberculosis.

The principal dangers connected with phthisis are found in haemoptysis, general miliary tuberculosis and mixed infection, and the two sources of danger first mentioned are usually due to the third, which thereby becomes the principal source of danger.

A fourth danger is connected with the formation of toxins; and here, too, mixed infection plays an important part.

The principal workers in the field of mixed infection have been Babes, Cornet, Ortner, Spengler, Schabad and the author.

From the joint labors of these investigators the important role played by mixed infection has been made manifest, and the combating of this tendency has become the cornerstone of phthisiology.

The term "mixed infection" was first introduced into pathology by Brieger and Ehrlich in 1882, upon the occasion of the coincidence of anthrax and typhoid fever in the same patient. Two diseases may exist in the same individual, or even in the same organ, and each maintain itself independently without any local hybridization; but it is none the less true that the toxic products of the two affections may mingle to-

gether in the blood, so that we are justified in speaking of this association as a sort of mixture.

Typical mixed infection, however, requires that there be an intimate local association of two or more microorganisms in a state of pathogenic activity; and in this sense Sata proposes to use the term, which implies further that the two germs, acting in concert, are able to cause a special disease-process which could not have been effected by either of the microorganisms when acting singly.

The idea of a dual origin of phthisis—a hypothesis necessitated for the explanation of the great diversity in the anatomical and clinical findings—can be traced back as far as Laennec; but it was not until Koch began his studies of the bacillus that the discovery of many kinds of virulent bacteria in the sputum led to the surmise that some of these microorganisms might play a role in the symptomatology of phthisis.

Numerous improvements in bacteriological technique have now rendered it possible to separate the saprophytes in the sputum from the organisms which were originally present in the sputum. Gradually it has been shown beyond doubt that the phthisical lung is actually inhabited by several varieties of pathogenic microorganisms.

The question now arises, How do these associated microorganisms produce the results ascribed to them?

As far back at 1891-2 Czaplewsky, Strümpell and Petruschky showed by comparative studies of the sputum and clinical phenomena that most of the fever of phthisis is to be referred to secondary infection.

In 1892 Maragliano hazarded the opinion that mixed infection transforms simple tuberculosis into phthisis, and many authorities immediately adopted this view.

But this new doctrine was opposed by such authorities as Straus, Leyden and others, by reason of the negative results obtained from independent study of the subject.

Various attempts to test the virulence of the various bacteria in the sputum led to opposite conclusions, making new converts and opponents to the theory of mixed infection.

Sata's own studies appeared to show that whenever a cavity forms and comes into communication with the external air, extraneous bacteria settle therein and begin to multiply without calling forth special phenomena. Sata thereupon named this state of affairs "latent mixed infection," for it is evident that the microorganisms are in a position to exert pathogenic action in their immediate vicinity, as well as to be transported by aspiration to other portions of the lungs.

At what period in the evolution of tuberculosis does the patient fall a prey to mixed infection?

The original belief was that the later stages of phthisis alone are concerned with secondary infection, and only at a recent period has it been shown by Turban and Brieger that mixture of infection may complicate the earlier period of tuberculosis.

Turban speaks of "transitory mixed infection," which serves the purpose of directing the attention to the existence of a latent focus of tuberculosis.

Brieger and Neufeld have recently demonstrated the same phenomenon in connection with a tuberculous focus made manifest by an attack of influenza or pneumococcus-infection. Not rarely this secondary infection proves fatal under these circumstances. This type of affection is styled by Turban "primary tuberculosis with transitory or permanent mixed infection." Naturally, every subsequent period in the evolution of tuberculosis may fall a prey to this secondary infection.

What is the clinical picture of mixed infection?

Up to the present time we have no pathognomonic sign of this affection. The most important symptoms are atypical fever, abundant expectoration and extensive pneumonia.

Pneumonia in the midst of phthisis was known by Laennec as "gelatinous infiltration" and after numerous other designations finally became "caseous" pneumonia. Its nature has been zealously debated. Certain authorities, including Ortner, prefer to regard all broncho-pneumonias in the course of phthisis as independent in origin of the tubercle bacillus, and due to some associated germ—the streptococcus, diplococcus, diplobacillus, etc. On the other hand, other authorities hold diametrically opposite views, regarding these examples of broncho-pneumonia as due to the tubercle bacillus and its toxins. Sata believes that the most reasonable view to take is that both the tubercle bacillus and some other microorganism, acting in concert, are responsible for these pneumonic complications. In fact, the existence of "mixed pneumonia" appears to have been proven by Babes, Cornet, Spengler, Schabad and the author beyond a doubt.

Sata is of the opinion that mixed pneumonia comes about through the aspiration of the contents of a tuberculous cavity. In this way there may develop either disseminated foci or diffuse pneumonia involving entire lobules.

The foreign bacteria of mixed tuberculous pneumonia are the streptococcus pyogenes, staphylococcus aureus, diplococcus lanceolatus

and influenza-bacillus. The two first named are especially likely to cause dissolution of the lung tissues. The diplococcus lanceolatus causes a peculiar haemorrhagic-fibrinous pneumonia, while both it and the influenza germ may sometimes give rise to a mild, transitory type of pneumonia.

Sata agrees with the opponents of mixed infection in the admission that some cases of pneumonia may be purely tuberculous.

The next phase of mixed infection to be considered is fever, naturally a subject of the utmost importance in this connection.

The great majority of clinicians now look upon hectic fever as a phenomenon of mixed infection, due to the streptococcus.

In other words, it is the same fever which accompanies erysipelas, acute suppuration, puerperal fever, etc., as shown by the characteristic curve—otherwise Petruschky's streptococcus curve. Cornet uses the term "septic" in designating this fever, and Petruschky describes the general condition of the patient with hectic as septicaemia.

A difference, however, appears to exist between hectic and septicaemia. The latter condition, as shown by the presence of streptococci in the blood, is never witnessed until the very latest stages of phthisis, while the hectic fever is a general symptom of phthisis and is of long duration. There is but one way to explain this apparent paradox, and that is by the assumption that hectic is due to the toxins of the foreign bacteria.

Irregularity in the course of the fever of phthisis is explained by the secondary inflammations caused by the foreign bacteria, and as a matter of fact this phenomenon adds to the gravity of the prognosis.

Schabad has shown that pure tuberculosis can certainly produce fever, so that its influence must be reckoned with in dealing with the causes of hectic.

The typical streptococcus-curve, which has been seen in connection with hectic fever, is found only exceptionally in mixed infection, which is usually characterized by an irregular curve with a tendency to remission or to continued fever.

Those who regard hectic as practically a streptococcus phenomenon explain some of these anomalies by the statement that a lowered virulence exists in phthisis as compared with other streptococcus diseases, such as erysipelas and puerperal sepsis. There is one condition in which the sputum is found loaded with virulent streptococci, although no fever is present. Spengler finds that in this case the cicatrical tissue of the lung has become infected.

Sata now returns to the question of fever accompanying pure tuber-

culosis. This has been shown beyond doubt by von Strümpell, Cornet Spengler, Schabad and the author. While this type of fever is thought to be mild as a rule, it appears to have been proven by Spengler and Schabad that the tubercle bacillus is now and then the sole cause of hectic. The so-called *typus inversus*, or hectic with higher morning temperature, is pronounced by these investigators to be due wholly to Koch's bacillus. The author next takes up the subject of the sputum in its relation to mixed infection.

It has been claimed repeatedly by clinicians that the sputum of mixed infection is often very abundant, and Cornet states that even to the naked eye the sputa have a characteristic appearance. Nevertheless, we also see mixed infection in which there is very little expectoration for a long period. Although so scanty in amount the sputum of these patients may be found to swarm with bacilli. This state of affairs occurs especially in connection with mixed infection from the influenza bacillus and the diplococcus.

Mixed infection is not necessarily always active, for it may be passive or latent. Under such circumstances we do not expect to find fever. Some doubt has been cast upon the truth of the existence of passive mixed infection by the statement of Schabad that the "passive streptococcus" was not the streptococcus pyogenes, but a harmless variety of this form of germ-life.

Does mixture of infection ever exert any salutary action upon the tuberculous patient? Apparently it has had this effect, as Sata cites numerous cases, some of them dating back a number of years, in which erysipelas has brought tuberculosis to a standstill. Romer and Klemperer have also produced the same result with the proteins of the micrococcus prodigiosus and bacillus pyocyaneus. Sata has come to the conclusion—based upon animal experiments—that in this idea we have the foundation of a successful therapy for phthisis.

ON THE INVASION OF THE BLOOD BY THE MICRO-ORGANISMS OF SECONDARY INFECTION IN THE COURSE OF CHRONIC PULMONARY TUBERCULOSIS.

Teissier (*Jour. de Phys. et de Path. Gén.*, Mar. 15, 1901) states the existence of secondary infection in phthisis was made certain by Koch in 1884, on the occasion of his discovery of many kinds of germ-life in tuberculous cavities. Authorities, however, still differ widely in their explanation of the *modus operandi* of secondary infection. An un-

settled question is this: Is Koch's bacillus itself able to cause exudative pneumonia? The author has made a special investigation into this matter of accessory infection in tuberculosis, and began to publish articles relating thereto as far back as 1894, at which period he attempted to show that tuberculosis was accomplished by a septicopyaemia capable of causing cardiac lesions. In 1897 and 1898 he made demonstrations of secondary bacteria in the blood during the period of tuberculous cachexia. Upon this latter subject he has continued his labors, and has now tested the blood of some 53 individuals. Out of this material he has obtained nine positive results, viz.: *Staphylococcus aureus*, 2; *staphylococcus albus*, 4; *streptococcus*, 3. The technique employed was that of Straus.

The author's positive results show that the invasion of the blood of tuberculous subjects by bacteria other than the tubercle bacillus is possible. A condition of hyperthermia, progressive asphyxia and general intoxication is very favorable for secondary infection. Nevertheless, the author's results appear to show that such accessory infection of the blood is infrequent. Much of the negative character of the findings may, however, be due to defective technique; or perhaps secondary germ life may invade the blood only to be destroyed by the germicidal power of the latter.

Admitting, then, that secondary invasion of the blood does occur, the next question to suggest itself is this: Is this invasion a mere harmless episode, or does it constitute a condition of sepsis? The evidence inclines us to the latter belief. The bacillus of Koch appears to be able to augment the virulence of the streptococcus, which in turn unfavorably modifies the evolution of the tuberculous process. If it usually happens that the secondary bacteria which have invaded the blood are relatively harmless—virtually saprophytic, in fact—it is also true that actual septicopyaemia may sometimes develop. Numerous authors have cited cases of infectious endocarditis in the course of chronic tuberculosis: Vaquez has noted the occurrence of arterial thrombosis due to the streptococcus, and other authors have reported instances of venous thrombosis under the same condition. Koch, Cornil and Babes and others have reported cases of septicopyaemia complicating phthisis. But facts like the preceding are certainly of rare occurrence.

What part does secondary infection play in the genesis of hectic fever? We can only state that this latter phenomenon is complex, due to various causes operating in concert, or to different causes at different times.

TOXI-INFECTIOUS ORIGIN OF INSANITY IN THE TUBERCULOUS.

Fuster (*Nouveau Montpellier Médicale*, April 14, 1901) draws the following conclusions from a consideration of this subject:

1. Mental affections cannot form a separate group in pathology. They are, of right, dependent upon infections and intoxicants of all kinds.

2. As in the case of other diseases, they exhibit more or less individuality, dependent upon inherited or acquired predisposition in the subject.

3. Mental heredity has no more importance than tuberculous heredity or syphilitic heredity.

4. A mental affection is in fact an individual cerebral reaction, acute or chronic, consecutive to a noxious influence acting directly upon the superior nervous centres.

5. These noxious substances are microbial toxins, vegetable or animal poisons, products of fermentation, of organic chemical reactions, etc. In some cases the blood may be seen to contain substances particularly noxious to the nerve cells.

6. The blood, penetrating into the intimate structure of the cerebral substance, causes diffuse irritation, which in turn produces diffuse lesions.

7. Some of these lesions escape all naked eye observation and are hardly recognizable by the microscope.

8. Infectious diseases may produce their effects either by direct localization in the nervous centres—as in the case of tubercle deposited in the brain—or by the action of toxins. In the first case we have cerebral manifestations which may often be determined by localization. In the other case, on the contrary, the manifestations do no more than accentuate the individual predisposition.

9. This double conclusion leads us to recognize a simple anatomico-clinical classification of cerebral diseases, viz., localized and diffuse.

10. Any defect of elimination, any disturbance of normal functions may by charging the blood with noxious products provoke various cerebral manifestations.

11. In any mental malady we should investigate the functions of all the organs with the greatest care.

12. With a better understanding of the etiology and pathogeny of mental affections we shall be able to institute a more rational treatment than we have at present.

The case which led the author to the preceding critique of the subject of the toxi-infectious source of insanity is summed up as follows:

Male, aged 38. An unrecognized ganglionic tuberculosis having a latent evolution extending over two years. Occasional attacks of mental trouble, hyperthermia, tachycardia. Period of improvement in mental state accompanied by lowering of temperature. Transitory aphasia and paralysis of sphincters. Confirmed insanity. Death in coma.

(The related case seems to us to offer but an imaginary basis for so bold and fanciful a theory. That a tubercular subject may become insane is not a matter of special wonder, when we consider the great prevalence of tuberculosis, and without an autopsy it needs still to be shown that an intracranial focal lesion was not responsible for the recorded mental and nervous manifestations. Whatever the pathology of the case may have been, the toxin theory is steadily growing in popularity as most convenient to account for all that we do not know.—Editor.)

PROPHYLAXIS OF TUBERCULOSIS.

Lancereaux (*Gaz. des Hôpitaux*, April 4, 1901) states that the discovery of the bacillus of tuberculosis has caused the neglect of a study of the soil. He therefore lays before the Academy of Medicine in Paris the results of his investigation of 2192 individuals from the standpoint of predisposition, including under this head all factors.

In this material he found 1229 alcoholics, 651 examples of defective aeration with sedentary existence, 82 cases of destitution and 91 examples of destitution plus pregnancy. In 93 cases heredity appeared to be the essential factor and in 46 contagion.

It is apparent, then, from these statistics that over one-half of all consumptives studied by Lancereaux were confirmed drinkers. Poverty, defective oxygenation, and in general bad hygiene are seen to have been responsible for 824 cases, (a number much smaller than that of the alcoholics).

Analysis of the 1229 alcoholics showed that no less than 330 of them were women. No one occupation predominated over all others, but many trades were represented. There were only 80 barkeepers, waiters, etc.

Tuberculosis in the alcoholic usually begins in the right apex, and this localization alone should excite our suspicions as to the etiology. Another feature of alcoholic tuberculosis is the occasional arrest of the

The article on "tuberculosis" comes from the pen of Professor Ruata of the University of Perugia, Italy. He discusses the subject under five heads.

1. When did the disease commence? That the disease long antedates the first symptoms of its discovery is a too-often overlooked point which is emphasized.

2. How does the specific bacillus reach and spread in the lung? While nothing new is introduced here, particular attention is devoted to improper breathing and alcoholism as contributory or predisposing causes.

3. What is the influence of the specific bacillus on the duration of the disease and on death from phthisis? The importance of mixed infection and the minor role of the tubercle bacillus as determining factors are pointed out.

4. The question of heredity. Here the author differs widely from the present accepted views that inherited tuberculosis is rare. He considers all, or almost all the deaths from tuberculosis (tabes mesenterica, tuberculous meningitis, phthisis) during first years of life as inherited—he believes that "the influence of heredity makes itself felt principally until the age of about ten years."

5. What about treatment? Because of the imbedding of the bacillus in a non-vascular structure, the tubercle, he concludes that "remedies given by the mouth are useless and for 2,000 years have not saved a single life."

He does not believe in the use of specific remedies, because they cannot influence the by far most potent cause of death, secondary infection, but pins his faith to the early and prolonged use of inhalants as a prophylactic measure against secondary infection.

Professor H. P. Loomis, New York, has contributed the article on "Phthisis," giving considerable prominence to "Open Air Treatment," the value of the tuberculin test and the significance of the pulse in tuberculosis.

LARYNGEAL PHTHISIS. By Richard Lake, F. R. C. S., London. With 36 illustrations, 21 of which are colored. Philadelphia: P. Blakiston's Sons & Co. 1900. \$2.00.

While all texts upon laryngology have devoted some space to tuberculous laryngitis, few have given the affection the consideration its seriousness demands. This book of less than 100 pages contains little irrelevant matter, and much concise information together with most excellent cuts illustrating every aspect of the disease, all of which make it very valuable to both laryngologist and phthisiologist.

The subject of nasal operations is not considered because the author has found that in his experience "the nose must be left alone as long as the patient shows signs of phthisis." We would wish that this important statement had found a more prominent position in the book in order that it might escape the attention of none.

TUBERCULOSIS AS A DISEASE OF THE MASSES, AND HOW TO COMBAT IT. By S. A. Knopf, M. D., New York. New York: F. M. Firestack, 1901. Paper, 25c. Cloth, 60c. Special prices to Boards of Health.

Dr. Knopf has for a number of years been intimately identified with the crusade against tuberculosis. This essay received the international prize offered by the International Congress to Combat Tuberculosis, held in Berlin, 1899. It deserves the most careful reading by every physician; its distribution by boards of health among the people will be of inestimable value. If we had more of such literature and more such indefatigable workers as Dr.

Knopf, much greater progress would be made in the great cause of the prevention of the spread of tuberculosis.

PULMONARY CONSUMPTION, PNEUMONIA AND ALLIED DISEASES OF THE LUNGS. By Thomas J. Mays, A. M., M. D. Illustrated. New York: E. B. Treat & Co. \$3.00.

Although the author's theory of the etiology of pulmonary tuberculosis is in direct opposition to the results of scientific investigation, it must be admitted that other factors than the specific bacillus do play an important role in the ease of infection and in the localization of the primary focus, but that disturbances of the pneumogastric may be the primary etiological factor is difficult to accept. The book is written with decision and conviction, the outgrowth of years of conscientious study and careful observation, and though we believe the pneumogastric is given an exaggerated importance, that very fact makes the book fill a most important mission in impressing upon the physician's mind the almost universally ignored, important nervous aspect of phthisis. If this book results in a more careful consideration of this side of phthisis it certainly has not been written in vain.

THE MISSISSIPPI VALLEY MEDICAL ASSOCIATION.

It is announced that the dates of the next meeting of the Mississippi Valley Medical Association have been changed from the 10th, 11th, and 12th of September to the 12th, 13th, and 14th of September. This change has been made necessary because the dates first selected conflicted with another large Association meeting at the same place.

The meeting is to be held at the Hotel Victory, Put-in-Bay Island, Lake Erie, O., and the low rate of one cent a mile for the round trip will be in effect for the meeting. Tickets will be on sale as late as September 12th, good returning without extension until September 15th. By depositing tickets with the Joint Agent at Cleveland and paying 50 cents the date can be extended until October 8th. This gives members an opportunity of visiting the Pan-American Exposition at Buffalo, to which very low rates by rail and water will be in effect from Cleveland.

Full information as to rates can be obtained by addressing the Secretary, Dr. Henry E. Tuley, No. 111 West Kentucky Street, Louisville, Ky. Members of the profession are cordially invited to attend this meeting.

Those desiring to read papers should notify the Secretary at an early date.

EDITORIAL.

SPECIFIC MEDICATION IN TUBERCULOSIS.

Under reviews of current medical literature the reader will find one of Dr. Goetsch's paper in which he reports 175 cases of pulmonary tuberculosis treated during the last ten years with Koch's tuberculin. To Dr. Goetsch's article a note is added by Professor R. Koch, and this we have appended to our review. This paper called forth an editorial in the "Journal of the American Medical Association" which we have also appended and from which it will be seen that the learned editor of the Journal considers Dr. Goetsch's results so marvelous as to encourage those who have faith in specific medication to expect the realization of their fondest hopes.

While the editorial of the Journal is indeed gratifying to all earnest seekers of efficient means of combating tuberculous disease, and while the results reported by Dr. Goetsch justify the attitude taken, those who have practical experience in the therapeutic use of tuberculin products will probably see nothing remarkable in these results, inasmuch as they are no better than have been habitually obtained, especially in cases so carefully selected as those of the series which Dr. Goetsch reports.

The unfortunate experience of the first few months after the introduction of the remedy has been a serious hindrance to its subsequent successful use, and, although this has been fully and convincingly explained as being the natural result of a bad selection of cases and of an injudicious use of the remedy, many of the profession have not as yet been able to overcome their prejudice.

Not only is this true, but without any practical experience whatever and without thoughtful and unbiased investigation of the claims in favor of the remedy, physicians have not hesitated to stigmatize it as a failure of the worst sort, as having no merit whatever and as invariably doing harm.

We note such an attitude to-day in the current number of the "Charlotte Medical Journal"; the discussion of a paper in favor of specific medication was opened by a gentleman by saying: "I think that the watery extract of tuberculin" (watery extract of tubercle bacilli, probably

meant) "is the best preparation that has been offered to the public, and I think that its great goodness consists in its extreme weakness. It is the weakest preparation and calculated to do less harm."

Like many others who take such an attitude, he is in the unfortunate position of one who offers an opinion upon a subject about which he has no practical and apparently no other information.

The hoped for confirmation of the results reported by Dr. Goetsch is, and has been, at hand and is to be found not only in German, but also in American reports.

The writer has himself reported 1020 cases treated with culture products of the specific germ, with results which, if we take into consideration the extent of the disease and the frequent presence of complications, materially exceed those which the editor of the Journal considers as calculated to inspire us with new hope.

The reader will note that in Dr. Goetsch's series, the cases selected were of a particularly favorable type, inasmuch as patients with fever were not accepted, and of all the cases treated, tubercle bacilli were present in the sputum of but 88.

Concerning the first twenty-one cases treated with tuberculin by the writer in '90-'91, inquiries made two years later elicited the information, that of five first stage cases 100 per cent. recovered and remained well; of seven second stage cases six or 86 per cent. recovered and were still in good health, while one had remained improved; of the third stage, or far advanced cases, three had remained greatly improved, three improved, making 46 per cent., while seven had died.

In the fall of 1900 inquiries were again made in regard to this same series of cases and it was ascertained that all of the first stage cases remained cured; six of the seven second stage cases were also still well, and one had died; of the third stage cases, three of the original thirteen were, and had continued in good health, having had no relapses or symptoms of any kind. This would give us for first stage, 100 per cent.; second stage, 86 per cent., and of third stage, 23 per cent. of permanently cured cases after a lapse of nearly ten years. Similar inquiries in regard to the per-

manency of results in cases treated thereafter have been equally satisfactory.

In more recent years with a preparation much superior to Koch's old or new tuberculin, both in purity and in uniformity, we find that the results surpass those obtained by Dr. Goetsch, and we may truly say that failure to secure a satisfactory and permanent recovery is most exceptional in early stage cases, and may even then be avoided if the patient remains under treatment for a sufficient length of time.

The clinical report from the Winyah Sanitarium of 225 cases of pulmonary tuberculosis, treated in the institution from January 1st, 1899, to December 31st, 1900, shows in 53 Class A, or first stage cases, 49 recoveries, i. e., 92.5 per cent., three greatly improved, i. e., 5.6 per cent., and one improved, i. e., 1.9 per cent. We desire to call especial attention to this series of first stage cases, because according to our method of classification, they appear to be of the same sort as those selected for treatment by Dr. Goetsch. Had not four unfinished cases been included in this list which would undoubtedly have recovered under completed treatment, the percentage of cured cases would have been 100.

This result was actually attained in 20 first stage cases treated with the same remedy in 1898.

Of 80 class B, or second stage cases treated in 1899 and 1900, 51, i. e., 63.7 per cent. recovered, 22 or 27.5 per cent. were greatly improved, and 7 or 8.8 per cent. improved. None grew worse or died.

In 1898 thirty-seven cases class B, or second stage cases were treated with the result that 27 or 73 per cent. recovered, 7 or 19 per cent. were greatly improved, and 3 or 8 per cent. improved. None of these grew worse or died.

Let it be noted that Dr. Goetsch's series and the writer's class A cases were all in the early stage and that both series were institution patients.

Since therefore, the latter's percentage of cures exceeded the former's by almost 30 per cent. in the early stage, with results almost as good in class B, or second stage cases (in whom the disease was sufficiently advanced to exclude them from the tuberculin treatment accord-

ing to Dr. Goetsch's standard), the writer's results would certainly seem to testify to the superiority of the preparation employed by him in the last three years.

If additional confirmation of Dr. Goetsch's results is desired, we refer to the clinical report of Dr. Charles Denison, published in this Journal for April, 1901, in which he gives his experience of the past ten years with tuberculin preparations in their application to all stages of the disease.

There is nothing new in the method of application of the remedy as recommended by Dr. Goetsch. That reactions are unnecessary and that they should be avoided was pointed out by the writer as long as ten years ago. He was the first to call attention to the fact that the best results are obtained by so gradually increasing the doses that there is no rise of temperature nor other discomfort to the patient.

That patients should be confined to the bed on the day of and the day following the injection seems to us to be an unnecessary precaution, especially so, if the pure toxins from the bodies of tubercle bacilli are employed. Such confinement interferes with the patient's best interests, by depriving him of out of door life, sunshine and permissible exercise, the advantages of which are conceded on every side.

We should mention that in many cases we have had the opportunity of applying the tuberculin test after from six months to nine years from the time the patient was discharged as cured, and that with only a few exceptions full test doses of tuberculin were not followed by any reaction whatever.

The application of the test immediately after completion of the treatment we have found unreliable, even if large doses as given by Dr. Goetsch are used.

Although the editor of the Journal has failed to notice the results that have been obtained in America, it is a source of satisfaction to us to note that the report of Dr. Goetsch has attracted his attention, thereby affording us the opportunity of pointing out the fact that in tuberculin therapeutics, as in other directions, equally good and even better work has been, and is being done, in our own country.

SUPPLEMENT TO THE JOURNAL OF TUBERCULOSIS.

In this part the whole subject of Pulmonary Tuberculosis will be covered by a continued series of articles written by Dr. Karl von Ruck to appear in the following order:

Article I.—The Cause of Tuberculosis, and The Conditions Which Pre-dispose to its Acquirement. Article II.—The Prevention of Tuberculosis. Article III.—The Pathology and Symptomatology of Pulmonary Tuberculosis. Article IV.—The Diagnosis of Pulmonary Tuberculosis. Article V.—The Prognosis of Pulmonary Tuberculosis. Article VI.—The Treatment of Tuberculosis, Dietetic, Hygienic and Symptomatic. Article VII.—The Climatic Treatment. Article VIII.—The Specific Treatment. Article IX.—Laryngeal Tuberculosis, its Diagnosis and Treatment. Article X.—Institutions for the Treatment of Pulmonary Tuberculosis.

THE TREATMENT OF TUBERCULOSIS.

[CONTINUED FROM PAGE 208.]

In this class of cases, as well as in those heretofore considered as being poor and capricious eaters and as having normal digestive functions these views should always be confirmed by a careful examination of the digestive power of the stomach. In not a few instances it will be found that such a view is, after all, erroneous by finding evidence of atony or of gastric catarrh.

For the convenience of those who are unacquainted with the details, or having need to refresh their memory in the absence of text books or monographs on the subject, the method of examination as usually recommended and as practiced in my institution is given below:

It is the intention of the writer to give briefly but in sufficient detail the various steps in the process of an ordinary chemical examination of the stomach contents for clinical purposes, purposely leaving out those things which would be of doubtful utility to the general practitioner.

The apparatus and reagents for systematic examinations, as will be seen from the lists below, are with few exceptions, to be found in almost every physician's armamentarium.

APPARATUS. Test-tubes, burette (graduated to 1-5 c. c.), glass rod, small funnel, small evaporating dish and filter-paper.

REAGENTS—Congo paper, Gunzburg's Reagent (phloroglucin 1., vanillin 2., alcohol 30), decinormal sodium hydrate solution, phenol-phthalein (1 per cent. alcohol solution) carbolic solution (1-2 per cent.), ferric chloride, ether, sodium hydrate solution (10 per cent.), copper sulphate (1-2 per cent. solution), and sodium chloride (saturated solution).

THE TRIAL BREAKFAST. A trial meal consisting of 1 to 2 ounces white bread and 2 glasses water or weak tea, without sugar and milk, should be given at a time when nothing has been taken into the stomach for several hours previously.

One hour later the stomach tube is passed and the contents removed.

Oftentimes, on account of the small amount of fluid, difficulty is experienced; coughing or straining will usually start the flow, especially if the patient is directed to lie on the side and to press firmly on the stomach with both hands. The stomach pump should be a last resort only. If qualitative tests only are to be made, a small quantity of water may be used to start the flow, but the results of such examinations are often misleading.

Contraindications to the use of the stomach tube are recent haemorrhage, bloody expectoration, extensive softening, recent pleurisy, suspicion of gastric ulcer and great general exhaustion.

EINHORN'S BUCKET. In those cases where use of the tube is contraindicated, this ingenious little capsule-like bucket may be used and enough of the stomach contents removed to make necessary qualitative tests.

A description of the use of this device would be superfluous here—any one possessing it is already familiar with its use, or may become so by reading the printed directions accompanying the set. However, it may not be amiss to call attention to an easy means of removing one objection which has been frequently made to its use, viz., the difficulty of withdrawing the bucket when it reaches the pharynx: by passing the finger into the mouth, directing the patient to swallow, a gentle upward pull on the cord will easily carry the bucket over the obstruction.

CHEMICAL EXAMINATION. After the removed chyle is filtered it is ready for the following tests:

HYDROCHLORIC ACID. Free hydrochloric acid turns Congo-red to a deep blue color; but as the presence of large quantities of lactic and other organic acids give the same reaction, and as the phloroglucin-vanillin (Gunzburg's reagent) does not respond to the organic acids, it is better not to depend upon the simpler Congo-red test.

One or two drops of the filtered stomach contents are placed on a white porcelain dish; the same amount of the reagent is added and thoroughly mixed with a glass rod; the dish is then gently warmed over the flame. The appearance of a bright cherry-red color on the edge of the residue indicates the presence of free hydrochloric acid.

ESTIMATION. To 10 c. c. of the filtered chyle add one drop of phenol-phthalein solution; to this add drop by drop from the burette a decinormal solution of potassium or sodium hydrate until after thoroughly stirring, a pink color persists; now read carefully the number of c. c. of the alkali solution used, multiply by 10 and 0.00365 (the decinormal factor of HCl.) and the result is the percentage of HCl. If sufficient material is at hand, the estimation should be repeated to avoid possible error.

LACTIC ACID. (Uffelmann's test): One drop of the solution of ferric chloride is added to 20 c. c. of the $\frac{1}{2}$ per cent. carbolic acid solution, this is diluted till a transparent amethyst blue color is obtained. A few drops of the fluid to be tested added to a few c. c. of this solution in a test-tube, change the amethyst-blue to a canary-yellow if lactic acid is present. On account of the presence of various other things, this test is sometimes not distinctive, when the untreated chyle is used. A more certain procedure is to add to 10 c. c. of the filtered chyle in a test-tube 10 c. c. ether; shake thoroughly; allow the ether to separate, decant the ether into a clean test-tube; place the test-tube containing the ether in a glass of warm water till the ether has evaporated; add 5 to 10 c. c. distilled water to the residue, and test as above for lactic acid.

For the quantitative estimation of lactic acid, and for tests for the fatty acids, reference must be made to such books as Einhorn's *Diseases of the Stomach*, Simon's *Clinical Diagnosis*, Sahli's *Lehrb. d. klin. Untersuchungsmethoden*, Halliburton's *Chemical Physiology and Pathology*, etc.

PROPEPTONE. To 5 c. c. chyle, add 5 c. c. saturated solution of sodium chloride and 2 drops acetic acid. A cloudiness or precipitate indicates propeptone, especially if the precipitate disappears on heating and returns on cooling.

PEPTONE. Filter out any propeptone from above, add an excess of sodium hydrate solution, mix thoroughly and add one or two drops of a weak solution copper sulphate (1-2 per cent); the appearance of a violet-red or old-rose color indicates peptone. This is the so called burret reaction, which most peptones and albumoses give.

PEPSIN. For this test we require uniform, small pieces of coagulated albumen; these should be little circular slices of hard boiled white of egg, 1 centimeter in diameter and 1 millimeter in thickness, which may be preserved in glycerin.

One of these little discs is placed in a test-tube containing 5 c. c. filtered chyle and kept at a temperature of 99° F; if it has been already shown that hydrochloric acid is absent, a drop or two of dilute hydrochloric must be added. The tube is observed every 20 to 30 minutes to note the progress of digestion and the time required for complete disappearance of the egg albumen.

RENNET. Add a few drops chyle to 5 to 10 c. c. milk and place tube in water at temperature of 99° F.

MOTILITY. The motility of stomach may be tested in various ways; probably the salol-test, although open to many objections, is the most used.

This test finds the foundation for its use in the fact that salol is not absorbed until it reaches the alkaline secretions of the intestine, by which it is decomposed. The test is untrustworthy where the stomach secretion is alkaline. The time between ingestion and the appearance of salicyluric acid in the urine is noted by examining the urine at intervals of one-half and one hour after taking 15 grains of salol (immediately after meal). If salicyluric acid is present in the urine, the addition of a few drops of a solution of ferric chloride gives a violet color. If the appearance of the test is delayed longer than an hour or an hour and fifteen minutes, the motility is usually considered below normal.

RESORPTIVE POWER. This may be tested very easily by giving four or five grains potassium iodide in capsules before meal time, and by testing the saliva every few minutes for iodine by dipping strips of filter paper moistened with starch paste into the saliva acidulated with nitric acid.

More weight is probably to be laid upon the percentage of free hydrochloric acid. A few common observations of the indications of the hydrochloric acid percentages are here given.

NORMAL. Frequent in simple atonic and neurotic conditions of the stomach, attending oftentimes the very earliest manifestations of pulmonary tuberculosis.

HYPERACIDITY. In the beginning of chronic catarrhal gastritis and in gastric ulcer. We must here distinguish between the hypersecretion hyperacidity, and the hyperacidity coming on only during digestion.

HYPOACIDITY. Chronic catarrhal gastritis, anæmia, intense mental disturbance, neurasthenia, cachexia, sometimes in emphysema (passive congestion), and after long use of alkaline salts and salines.

ANACIDITY. In continued septic conditions, atrophic catarrhal gastritis, pernicious anæmia, carcinoma, etc.

If we find that the stomach digestion is normal in all respects, the feeding through the tube is simple enough; and after the patient has become educated and accustomed to the passing of the stomach tube by its use for the prior examination, the feeding should occur at intervals of four or five hours, according to the amount of food introduced.

At the beginning the quantity should not be excessive. I usually give one pint of milk, four ounces of cream, with two raw eggs, for the first feeding, and slowly increase the amount until I reach a quart of this liquid; if I desire to increase the nitrogenous elements beyond what is contained in the eggs and milk, I add beef-meat, finely ground raw beef, or if I desire the carbo-hydrates in excess, I add proportionally more cream and yolks of eggs. The control of the weight will indicate when the amount of feeding has reached the proper limit, which I believe to be the case when an average gain of two pounds per week is observed. I would particularly caution against pushing the feeding beyond this point, as it is liable to cause attacks of indigestion with diarrhoea, and thereby to jeopardize the ultimate result.

An entirely different dietary and management is necessary when the digestive power of the stomach is actually impaired or when gastric catarrh is present, alone or in combination with atony.

THE DIET IN ATONY OF THE STOMACH.

Liquids are but slowly absorbed and often not at all; they should, therefore, be given in small quantities only. Thin soups, tea, coffee and beer should be entirely eliminated. In addition to frequent feeding of small quantities, the food, which must be thoroughly masticated, must be of a more consistent form and as finely divided as possible. This is especially necessary in severe cases, where all meats require to be minced or scraped and to be of the most tender quality. Eggs, soft boiled or poached, are to be eaten with dry stale bread or with dry toast; small quantities of fats (butter and cream) may be allowed; all vegetables must be given as thick purees, avoiding cabbage, beans, peas, corn and onions, and preferring potatoes, rice, turnips, carrots, spinach, and the tips of asparagus. Breakfast foods which have been superheated in their preparation are particularly suitable and of breads the coarse sorts, like graham or whole wheat and corn bread, should be used sparingly; hot breads of any kind must not be used at all, stale white bread, toast and zwieback having preference.

Salads and relishes are not admissable and of fruits only baked or

stewed apple or juices of fruit should be allowed, while for dessert baked custards and simple puddings (not too sweet) are permissible.

Drinking during and soon after meals must be limited to the smallest quantities possible—milk can only be given in small quantities, and must be eaten with stale bread or cracker rather than drunk.

In milder cases more freedom is permissible and the boiled, broiled or roasted meats of poultry, beef and veal and fresh fish may be tried. Eggs may also be given in the form of light omelette. Small quantities of tea can be allowed, and the amount of cream may be increased, but no exception should be made in favor of leguminous vegetables. Cabbage or onions and raw fruits must still be omitted.

By taking into consideration the remaining digestive power of the stomach, which is of course re-determined from time to time, the adjustment of the diet is made to the present capacity, and the greater we find the deficiency of free hydrochloric acid, the more circumspect must we become in permitting meats and white of eggs.

All foods should be properly seasoned; the addition of Hungarian red pepper (paprika) in small quantities deserves a careful trial.

Although the consideration of therapeutic measures belongs more properly to the section devoted to the treatment of symptoms, in order to keep clinically related subjects together, I prefer to consider the useful additional measures for gastro-intestinal complications in connection with the diet.

Of these the most reliable and promising in atony of the stomach is undoubtedly the application of mechanical stimuli to the stomach and intestines, and for this purpose the use of electricity naturally suggests itself. Its utility is acknowledged by most writers, not only for increasing the muscular power, but also for restoration of the secretory functions. As far as I have been able to observe, I do not believe that there is any material advantage from the "internal method," which consists in the introduction of an electrode into the stomach after the patient has swallowed a glassful of water, the current passing through the water to the stomach walls and to another large electrode which is placed upon the integument over the gastric region in front and back, and also over the course of the large intestine, when, as is usual, constipation is an associated symptom.

Externally applied, and as I believe with equally good results, large electrodes, one the size of a saucer and the other that of a breakfast plate, are applied in front and back of the stomach (the larger electrode anteriorly) in such a manner that they cover the surface which corre-

sponds with the position of the stomach, the electrodes to be not more than an inch apart. If a roller electrode is at hand and moved with more or less pressure over the stomach, the mechanical effect of massage may be taken advantage of at the same time.

The current should be strong enough to induce, in the course of five to eight minutes, a sense of warmth in the interior of the stomach, when the application should be stopped. In most instances the benefit of electrization becomes apparent at an early period, and I have observed it after the first application by a decided increase in appetite, especially when the application was made shortly before a meal; autosuggestion may, however, have also an influence in such a prompt result.

Manual manipulations at the hand of a skillful masseur are also valuable, and of drugs, the internal administration of strychnine is undoubtedly the most valuable general adjuvant. In instances where the normal ferments or acids are markedly deficient, their temporary use has appeared to me of decided benefit, and the fear that an artificial supply will delay the return of sufficient secretion is not justified by my experience. I usually give three grains of pure pepsin or five minims of dilute hydrochloric acid, or both, every twenty minutes after each meal until three or four doses have been taken.

In fermentation and in hyperacidity from the presence of lactic or fatty acids, daily washing of the stomach is helpful, and symptomatically the use of full doses of bismuth and of small doses of ichthyol or creasote, or instead, twenty to thirty grain doses of benzoic acid prove sometimes of more or less temporary advantage.

THE DIET OF GASTRIC CATARRH.

When, as is frequently the case, it is associated with atony, the diet given for the latter condition must be adhered to, regardless of whether the atony has been the cause or the effect.

In cases where catarrh exists without material loss of digestive and motile power, the first step should always be to determine the cause or causes which have led to its development or are contributing factors to its increase and maintenance, with a view to their removal. Often it will be found that the catarrh is the sequella of an acute attack of indigestion, or has followed excesses in alcohol, or that its gradual development depended upon long-continued, less striking errors, including the use of drugs.

In some of my cases in which the gastric complications preceded or developed in the course of phthisis, they occurred in inveterate smokers and tobacco chewers, but abuse of alcohol and the injurious effects of

drugs appeared most frequently responsible. Of the latter I call particular attention to creasote given injudiciously in larger doses than the patient can tolerate, with a view of obtaining a germicidal effect, and to a variety of cough mixtures, especially those which contain opiates which lead to constipation and secretory disturbances. Owing to the importance of preserving a good digestion, I repeat again that in the administration of drug remedies the digestive organs must always have the first consideration, and that no medication can be countenanced which is liable to impair their functions.

As contributing more or less to the acquirement or to the maintenance and increase of chronic gastric catarrh, I again call attention to unsuitable quantity and quality of food, especially to rich pastry and candy, to bad teeth and bad care of the mouth, as well as to hasty eating with insufficient mastication, and also to the fact that any of the direct or contributing causes are the more liable to become effective in patients otherwise physically reduced, and when fever impairs and retards the digestive process. Here I should perhaps also mention passive congestion of the organs supplied by the portal system, induced by a weak circulation in the last stages of the pulmonary disease, when the right ventricle begins to show evidence of insufficient power or of degeneration.

Ice water, ice cream and fruit ices or excessively hot foods and drinks should be prohibited from the prophylactic as well as from the therapeutic standpoint; care should also be taken that the popular use of hot water before meals with a view of aiding in a cure does not really become a source of injury by its excessive temperature, which for such purposes should not exceed 105° F. The diet otherwise depends largely upon the stage of the disease, which may be appreciated from the clinical symptoms. In the beginning the manifestations are more or less vague and intermitting; they consist of what patients ordinarily term indigestion, because of some sense of fullness and eructations after meals, which usually disappear before the next meal is taken. As the case goes on these symptoms, which may have been noted only after the principal meal, occur at other meals also, and are more pronounced when slighter errors in diet have been committed. The action of the bowels becomes irregular, with, on the whole, a tendency to constipation that may alternate with attacks of diarrhoea, and to these symptoms are gradually added more decided gastric fullness and pressure, gaseous and liquid eructations, heart-burn, nausea and vomiting, first only on special occasions and later after most of the meals.

In the early period patients often hold their weight remarkably

well, or they may even show an increase; later as the disease progresses and as they dread the resulting discomfort from eating, the patient reduces the amount of food of his own accord, or loses what he takes through diarrhoea and vomiting. Loss of weight and strength and anaemia become then more prominent features.

When the symptoms are still vague and the digestive power of the stomach is not yet materially impaired, radical dietetic measures are not required; in many instances the symptoms disappear permanently from simple attention to the quality and quantity of food taken, by substituting a preponderance of well-cooked starchy foods in the form of thick purees with plenty of stale white bread or zwieback, while of the meats only the lighter sorts are given in small quantities. Milk may also enter the dietary in proportion as the quantity of free hydrochloric acid still present may be effective in the precipitation of the casein. Koumiss, matsoon or buttermilk may be tried if sweet milk appears to be less acceptable.

The more confirmed and chronic the gastric catarrh has become, the more liable is it that the digestive power of the stomach has been impaired. In all such cases chemical examinations as heretofore indicated and washing of the empty stomach for the determining of the amount of mucus present are necessary for intelligent procedure, with regard to the diet as well as with other treatment.

If the washing of the empty stomach shows mucus in quantity that justifies the expectation of its becoming a mechanical hindrance to digestion by enveloping the food, and thus preventing the peripheral action of the digestive fluids, regular washing with a warm two per cent, salt solution before the principal meal is essential. This has the additional advantage of giving opportunity for more intelligent regulation of the quantity and quality of food and the frequency of feeding through observing the undigested remnants in the washings.

With the view of exciting the gastric secretions, the use of mineral waters (Vichy or Carabana) may be tried, always giving them on an empty stomach. The drinking of hot water (105° F.) with a little salt added before meals is often of benefit. Carabanas in small quantities and Karlsbad salts are most suitable when a mild aperient effect is also desired on account of constipation, but cathartics should be avoided.

Of the bitter tonics, strychnia or tincture of nux vomica, as also gentian, condurango and colombo suggest themselves, but in confirmed cases they are, as a rule, ineffective, and in mild cases a proper supervision of the diet is all that is really necessary. The internal administration of

hydrochloric acid and pepsin should be resorted to when the corresponding secretion in the stomach is deficient or in abeyance. Electricity and massage are indicated in all those cases in which the atony is still a feature after the catarrhal state of the gastric mucous membrane has been controlled or removed.

THE DIET IN DILATATION OF THE STOMACH.

The diet in dilatation of the stomach is practically the same as in atony, only that instead of a preponderance of carbohydrates, which are more liable to be retained and to decompose, albuminous foods should be given in excess, and the amount of liquids, especially with meals, needs still greater restriction. In severe cases rectal feeding becomes indispensable, and what has been said of the application of electricity for atony applies here as well. In dilatation, washing of the stomach is the most important of all aids and should be resorted to at least once a day and twice if possible. The best time is before supper, and if two washings are decided upon, the other should be before breakfast.

While the use of strychnine in rather full doses is beneficial, remedies which prevent fermentation are more apparently effective in relieving the patient's discomfort, and have often a decided influence over the associated diarrhoea. As most effective in my experience I prefer resorcin, salicylate of bismuth, ichthyol or benzoic acid.

THE DIET IN DIARRHOEA AND CONSTIPATION.

Both in the temporary and chronic affections of this nature the diet does not differ materially from that which we follow when they occur independent of tuberculosis of the lungs. In either case we seek to overcome constipation with a dietary in which fresh vegetables and fruits are freely included; and when, as in fever, the diet is chiefly of liquid food, especially of milk, or is otherwise of a character which leaves but a small residue, massage, the faradic current and if necessary aperients must be given. For the latter I use phosphate of soda, Carabanas water or Karlsbad salts in preference to Seidlitz powders or Hunyadi's.

The diarrhoeal affections should rather be prevented than treated, errors in diet and eating solid food when fatigued are often responsible for short attacks, which cause loss in weight, sometimes gained with much difficulty, and thus hinder in the general improvement.

More obstinate forms occur in connection with severe attacks of coughing soon after meals, under which food insufficiently prepared in the stomach is liable to enter the intestine by being forced out of the pyloric orifice, in a like manner as occurs when the stomach contents are forced upward, and vomiting of food follows through the spasmodic con-

tractions of the abdominal muscles upon a full stomach. Eating of smaller quantities at more frequent intervals is naturally suggested until by other means the cough can be sufficiently controlled.

The diarrhoeas of colliquative character with more or less intestinal catarrh are often due to previous abuse of the digestive organs by improper food and alcohol, and as contributing or independently causing them, passive congestion of the portal system from failure of the right heart must again be thought of. If the latter is in evidence, absolute rest and such heart tonics as strychnine, strophanthus and digitalis should be employed; in either case the diet must be chiefly liquid, consisting of boiled milk, mutton and barley broths, superheated breakfast foods, like wheat hearts and grape nuts, soups of rice tapioca, farina or what is often very effective, soups made of flour roasted until it is brown. Such measures failing, we may give up starchy foods in part or entirely and change to expressed beef-juice, raw minced beef and egg albumin and give tropon in liberal quantities. Coarse breads, such as graham, whole wheat or corn bread are unsuitable; stale bread thoroughly toasted should be given instead.

A like dietary is indicated when the evidence points rather to tubercular ulceration, or when amyloid disease has made its appearance.

Medicinally, astringents, intestinal antiseptics and opium are chiefly relied upon, and the latter becomes at times indispensable. Tannin, or the fluid extracts which contain it, irrigations with one-fifth per cent. solution of nitrate of silver (if the large bowel is chiefly implicated), salicylate of bismuth in doses of ten to thirty grains, or the subnitrate in doses up to half an ounce, ichthyol, the carbonates of creasote and guaiacol, iodoform and many other similarly acting preparations have given fair results in controlling the fermentation and decomposition and in moderating the diarrhoea. More recently I have employed bisol, iodo-muth or xeroform with more satisfactory results than I have obtained before, and I feel that their employment has aided me more than any other measure in the final and permanent control of colliquative and tubercular forms of diarrhoea of a most obstinate character.

GENERAL DIETETIC AIDS AND ADJUVANTS.

Under this head we have still to consider alcohol, cod liver oil and fat emulsions, the malt extracts and a number of prepared food products, which on account of special properties and qualities become more or less important additions to other foods, or may for critical periods replace them.

In classing alcohol with these instead of with stimulants, I recognize it as a food substitute in so far as by its ready oxidation it becomes a means of husbanding the tissue albumins.

The use of alcohol in phthisis has been a subject of animated discussion in the past, and is likely to continue one of controversy in the future. In its consideration there is the likelihood of a more or less unconscious bias, not so much from the observations we make of its influence in the treatment of the disease, but from our personal attitude toward the alcohol question in general.

Omitting the ethical side of the question as having no place in its consideration as a remedy in the therapeutics of disease, the use of alcohol in the treatment and management of the one under consideration may be permitted, if not harmful, and it must be recommended or opposed as it may be beneficial or detrimental in the recovery of the patient's health and a correct answer to the following questions should show the strictly professional attitude:

First—Can the phthisical patient use alcoholic beverages without harm to himself?

Second—Is alcohol to be recommended as a tonic and appetizer, as a stimulant and as a food?

Third—Has alcohol any special therapeutic power in tuberculosis or phthisis?

In answering the first question we must certainly assume the affirmative, providing the indulgence is moderate. Take, for instance, a person that has been in the habit of drinking one or several glasses of beer, wine or whiskey daily or on special occasions, a person that does not indulge to excess, especially if he takes the beverage in social intercourse, with meals or in genial company, while by no means necessary or to be recommended, does not appear to suffer injury therefrom. Having formed the habit, the question that he will develop an increased appetite for liquor that will cause him to crave it and finally lead him to overindulgence and injury, the question of example and of temptation to others is not one that comes in our province as members of the healing art. About these we can have our special opinions and govern our own conduct; in our professional relations with our patients I hold that in general the question must be answered affirmatively.

Should the practical application of our answer apply to its use as a beverage by such that are not accustomed to its use or such who have shown want of proper self-control by having gone to excesses in the past, or by still others who although able to control their appetites have a fam-

ily history of inebriety, it is my opinion that in non-users we should discountenance the use of alcoholic beverages, and that in the others we must absolutely forbid it. In either case we must take this position in the direct interest of our therapeutic results, which we have no right to jeopardize, for we cannot tell what the result of an acquired habit may lead to in the one and must fear the worst consequences in the other.

To the second question, whether or not we shall *recommend* alcohol as a tonic, appetizer or stimulant or for its actual food value, I believe we must answer in the negative, but again with certain reservations.

That alcoholic liquors have these properties is undeniable; their stimulating effect has been known throughout all history, while a certain food value is only denied by prejudiced observers. These properties do, however, not necessarily justify its therapeutic employment so long as we can accomplish like results with other means that we deem equally safe and effective. If, however, we desire to stimulate the appetite in a patient heretofore accustomed to the use of alcoholic stimulants who does not otherwise come within the exceptions stated above, if in such a one we find that a glass of wine or beer increases the desire for food or its digestion, which it often does, or if such a result follow the stimulating effect of a glass of whiskey before the principal meal, and the patient prefers the latter, no contra-indication existing in other directions, we cannot reasonably object.

Much less can we object to the use of alcohol when with the failing nutrition in the advanced stages we need to resort to stimulating measures, and here we have to admit it for its food value as well, which then is highly desirable in conjunction.

Its use under the latter circumstances is, however, a matter of prescription of definite kind and quantity, and must have such supervision as we practice in the administration of other drugs, and I can say that in all my practice I have not seen the acquirement of the alcohol habit in one single instance, from its therapeutic use.

In regard to the third question, as to any special therapeutic power of alcohol in phthisis, I must enter an emphatic denial, and do this in spite of the reputed recoveries of patients that were kept more or less soaked with whiskey during long periods of treatment. Not using alcoholics or permitting them excepting as stated in considering the previous questions, I have, of course, not seen recoveries in my own practice as have been claimed for alcohol by others. Nevertheless, I have seen results of the so-called "whiskey cure" only too often in patients that have come under my care after its demonstrated failure, and in many instances

they were indeed objects of sorrow and pity. Accustomed to large quantities and continued stimulation, they suffered from gastric catarrh that made ordinary feeding for the time almost impossible; often there were complications on the part of the liver and kidneys and the circulation, and only in exceptional cases could the injury from the alcohol be sufficiently overcome that a satisfactory result was attained in the end.

In a number of instances such patients claimed to have been directed by their physician to "drink all the whiskey you can," and some had succeeded to a degree that they consumed from a quart to three pints every twenty-four hours.

The reputed whiskey cures appear to me like the cures claimed from a life of exposure and hardship, the so-called "roughing-it cure," with, however, that much in favor of the latter, that it implies an out of door life, which in a measure compensates for its attending injuries, the avoidance of which is the more likely in a very early stage, or in that of arrestment of the disease, when the patient is physically resistant, and can bear the exposures and deprivations incidental to life in a new, wild country with a minimum amount of harm. But the treatment to be recommended is not to be based upon the least harmfulness, but rather upon the greatest amount of benefit to be derived, and in either case the patients who may have survived could have made their recovery much surer and with infinitely less risk had a rational method prevailed. The great majority have, however, died directly and indirectly in consequence.

As to alcohol, neither clinical observation nor the studies of chemistry, physiology, hygiene, pathology or bacteriology give us the slightest ground for the assumption that it has any direct curative influence upon tuberculosis or phthisis, while amply attesting the adverse and decidedly injurious effect of its injudicious use or abuse, not only during the existence of the disease, but as a most potent factor in its acquirement.

That it can also be made helpful by its indirect aid in advancing or conserving the patient's nutrition and by stimulation in time of need, no careful, unbiased observer will deny.

COD LIVER OIL AND FATS.

At the present time few if any physicians believe in a specific effect from the administration of cod liver oil. On the contrary, as with a number of other remedies formerly given with the expectation of having a direct curative influence, the observed benefits have in the course of time found their rational explanation. Having learned that fats are a most essential part of a dietary which is best calculated to enhance the

patient's nutrition, we appreciate that the benefit from cod liver oil is derived in that manner, having the additional advantage of being more readily digested and assimilated by reason of the free fatty acids which it contains.

Many hypotheses were advanced from time to time as to the particular value of some of its contained substances and there have been those who saw its therapeutic value chiefly in its minute quantity of iodine (0.04 per cent.) and trace of bromine; others valued its biliary constituents, especially cholesterine; and still others believed that the bitter crystalline principle called morrhuol had a specific influence upon tubercular processes. The latter has had considerable employment in practice, especially by the French school, without, however, meeting the expectations based upon theoretical considerations.

After the value of fats in the consumptives' diet was no longer questioned, and when free fatty acids were shown to materially increase the digestibility of oils in general by forming soaps with the alkalies in the small intestine, thereby emulsifying the fats present, and finding that these acids are present in large quantities in the crude cod liver oil, the rational basis of its value became apparent. This view was further confirmed by results equal in all respects to those from the use of cod liver oil by the administration of other oils to which these acids were added in like quantities.

Although the action of cod liver oil is thereby satisfactorily explained, there are still a few manufacturers who continue to seek popularity for cod liver oil extractives by offering tasteless wines, elixirs and cordials of cod liver oil upon disproved and practically abandoned theories. The only value that these preparations can have is that of an alterative by reason of the minute quantities of iodine, bromine, sulphur, phosphorus, etc., and which accrues to the patient to even a larger degree when the whole oil is given in their stead.

In the present light upon the subject such substitutes are as irrational as we would consider the substituting of the salts contained in beef for the actual meat. The fat being what we look to for the chief therapeutic effects in the administration of cod liver oil in pulmonary tuberculosis, as well as in scrofula, anaemia, etc., the administration of the oil itself is necessary in order to obtain the nourishing, tissue building and tissue repairing effect.

Unfortunately, its taste and odor prove often so objectionable that nausea and vomiting follow its administration, and the dark sorts, which

by reason of the greater amount of free fatty acids present are most easily digested, are also most disagreeable to take.

That the nausea and vomiting are due to the taste and odor, is apparent from the observation of tolerance when by adjuvants of various kinds the objectionable taste and odor are more or less disguised or removed. Efforts for improving its palatability have brought into the market a large number of emulsions, in which the digestibility is further increased by a fine division of the oil globules.

The dark preparations of the whole oil are but little used; of the light sorts Peter Moeller's brand has much deserved popularity in this country, for it is really as palatable an oil as is possible to obtain; it has, however, the disadvantage of containing but a very small amount of the free fatty acids in comparison with the less palatable sorts.

Children, as a rule, make less objection to the taste and odor of cod liver oil than do adults, and they often take it with no objections whatever and sometimes with seeming relish.

The choice between the whole oils and emulsions in their stead is therefore a matter of greater digestibility, palatability and of expense. So long as we know the exact percentage of the amount of oil present in a given emulsion, the latter should be given in preference when the increased cost is not a hindrance.

The advantage of an emulsion is the fine division of the oil globules, and I believe that when it is given in doses equal to the pure oil its food value is considerably greater; that is to say, the same quantity of oil in the form of a good emulsion will go considerably farther, which in a measure compensates the greater cost.

Of the most popular emulsions which I have found reliable and as perfect as any in regard to percentage of oil claimed, fineness of division, stability of keeping without separating, and least objectionable to the palate, are *Scott's* and *Phillipp's* preparations, while *maltine with cod liver oil* and the pancreatized emulsion in the form of *hydroleine* or *Morse's cream of cod liver oil* commend themselves whenever intestinal indigestion is a factor in a given case. Hydroleine also contains a larger percentage of oil than do most other emulsions, some of which are, on the other hand, combined with hypophosphites, thus obviating their separate administration and incidental expense.

Although most patients succeed in taking a good emulsion or the combination of the oil with maltine (which also greatly disguises its taste) there are nevertheless those to whom its administration is impossible in any form whatever.

Under such circumstances I have found lipanin and the Russell emulsion of other fats very satisfactory substitutes. If the manufacturers of the latter could be persuaded to leave out the oil of cloves, which has no special therapeutic value, and to which many patients object to such a degree as to eventually refuse it altogether, it should become as desirable as it is otherwise a satisfactory substitute.

Lipanin is olive oil, containing three per cent. of free fatty acids; it is free from the unpleasant taste and odor of cod liver oil and easily digested and absorbed. In practice it has given satisfactory results in no wise inferior to cod liver oil. This preparation is much used in Germany whenever the difference in cost is not in the way.

Ordinary olive oil has also been tried and patients who have learned to like it as a salad dressing take it quite readily in smaller doses. It is, however, much more difficult of digestion than cod liver oil or lipanin and liable to cause looseness of the bowels when the doses are materially increased.

As a general rule I employ cod liver oil or its substitutes only when fats must be given in larger quantity than the patient is willing or able to take with his ordinary diet, which is often the case in spite of constant admonition. Ladies are especially delinquent in regard to taking enough of fats, especially in the form of fat meats, and if observed most of them will be found to dissect off the last particle of fat with the greatest care. In such instances the methodical administration of a cod liver oil emulsion will save an endless amount of urging with promises and failures, and accomplishes the desired increase of the nutrition to the satisfaction of all concerned.

There are undoubtedly a number of good preparations of cod liver oil emulsions other than those above mentioned. Scott's emulsion contains 46 per cent. of pure oil and $14\frac{1}{2}$ per cent. of c. p. glycerine. Each ounce represents six grains of hypophosphites of lime and three grains of hypophosphites of soda.

In Phillipp's emulsion the oil is pancreatized and wheat phosphates and glycerine are added; it has an acid reaction, precluding saponification.

Morse's cream of cod liver oil is a pancreatized emulsion and contains no chemicals, only gum acacia being used to impart consistency.

Hydroleine is also a pancreatized preparation, predigested by a special process of hydration and is ready for assimilation and absorption; it contains 67 per cent. of pure oil and about 30 per cent. distilled water.

NITROGENOUS FOODS.

Artificial food products which purport to supply nitrogenous ele-

ments are offered to the profession in such great numbers and varieties that it would be impossible to mention all of them in particular.

Much misapprehension seems, however, to exist as to their actual necessity in the dietetics of disease, and of their real food value when administered in the usually prescribed quantities.

The fact that the normal function of a part or organ is only then possible when its nitrogenous waste is adequately replaced, and that without nitrogenous food the living animal organism must eventually perish, although fats and carbohydrates are supplied in excess, has caused the profession to attach great importance to its regular supply in disease.

It should, however, here be stated that for the continuance of normal functions albumens alone are also insufficient, that they cannot substitute carbohydrates any more than carbohydrates can substitute albumen, and while a certain amount of albumen may be converted into fat if an excess is supplied, and fats in excess prevent nitrogenous waste to a limited degree, those who have studied nutrition and have a right to speak authoritatively are perfectly agreed that for a normal and continued nutritive balance albumens, fats, carbohydrates and salts must be supplied in proper proportion, though admitting that for temporary exigencies this proportion may be varied within considerable limits without serious harm.

The entire withholding of nitrogenous food showing a detrimental effect quicker than if fats or carbohydrates are withheld, has caused more attention to be given to its regular supply and, in fact, has frequently led to its supply in excess, while the other food constituents were more or less disregarded. I can conceive, however, of no dietary into which albumen does not enter, unless we were to resort to fats exclusively. All cereals and vegetables contain them and some of them to a large degree, as, for instance, wheat, rye, barley, rice and particularly beans and peas, which latter contain 23 to 24 per cent. Speaking of albumen, it is natural to think first of meat, eggs and milk, and to remember the vegetable albumens afterward. But when animal albumen is taken in but small quantities we should still remember the other sources before demanding an artificial supply. This the manufacturing chemists have met most adequately, if we judge from the great number of preparations in the market.

The demand for meat albumen that arose when the importance of albuminous food became fully recognized led first to the administration of beef teas and to the commercial preparation of beef extracts in the belief that these extractives supplied the required essentials of a nitrogen-

ous diet. After their indifferent food value was demonstrated the coagulable albumen was demanded, and to also save the digestive organs the task of its conversion, predigestion was resorted to. The true beef peptons became then popular, only to find that patients as a rule declined to take them, owing to their intensely bitter and disagreeable taste, and if this objection was overcome, that sufficient quantities were liable to cause gastro-intestinal irritation and diarrhoea.

After experimental studies and investigations developed the fact that the end product of gastric digestion is not a true peptone but an albumose pepton, which is further changed in the intestine into true pepton, the albumose preparations gradually replaced the true peptons.

At the present time most preparations of predigested albumen contain but small amounts of true peptons or none at all, and the albumose pepton is the popular form, which is also more agreeable to take and is comparatively free from irritating properties.

Their popularity rests largely, if not entirely, upon the supposition that in severe disease the stomach cannot convert albumen or should be spared the task of its conversion; but in this respect there is also a tendency to return to natural conditions, especially since it has been shown that the living organism can be kept in its nitrogen balance, although the stomach is entirely eliminated in the digestion of albuminous food, and that the intestine can elaborate it satisfactorily for absorption and assimilation.

In consequence of these demonstrations predigestion of albumen is now thought of less importance, while a large percentage of convertible albumen, in a soluble form or in as fine a state of division as possible, is held to be the chief essential which should govern us in our choice of a particular preparation.

As to the actual necessity of artificial beef preparations in the nutrition of the sick, I agree with those who hold that it does not exist as frequently as is commonly supposed and as their extensive application would indicate, but that in acute diseases of a febrile character and accompanied by great exhaustion and particularly in certain affections and complications on the part of the digestive organs, they are at times most valuable adjuvants to other foods and may when necessary be used to supply the nitrogenous part of the diet entirely.

In their administration it is essential that we know the actual food value of the preparation which we wish to employ. An adult of average weight at rest requires about two ounces of pure albumen per day, an amount which may temporarily be diminished to one ounce if fats and

carbohydrates are given in adequate excess. Raw meats contain about 22 per cent.; milk 3 per cent.; eggs 12 per cent.; flour about 10 per cent.; peas and beans 24 per cent. of albumen in addition to fats and carbohydrates. While peas and beans can rarely enter into the dietary of fever patients, and of such as have severe gastro-intestinal complications, excepting in small quantities as soups and purees, their high percentage of albumen should not be forgotten when their digestion can be readily accomplished.

A knowledge of the proportion and amounts of albumen, fats and carbohydrates of different articles that enter into an ordinary diet is particularly desirable whenever we wish to substitute them with artificially prepared products from the laboratory. Tables which supply this information can be found in any treatise on physiological chemistry.

The following table may serve the convenience of the reader:

	Albumen. Per cent.	Fats. Per cent.	Carbohyd's. Per cent.
Cow's milk.....	3.04	3.06	4.08
Skim milk.....	3.06	0.80	4.75
Butter	0.68	83.10	0.70
Cheese (whole).....	27.16	30.43	2.50
Beef	21.39	5.20	....
Veal (lean).....	19.86	0.82	....
Lamb	17.10	5.80	....
Calf's liver.....	17.60	2.40	5.50
Chicken	18.50	9.34	....
Turkey	24.25	8.50	....
Duck	22.50	3.10	2.30
Ham	23.97	36.48	1.50
Pork (lean).....	20.25	6.80	....
Pork (fat).....	14.54	37.35	....
Fresh fish.....	17.00	8.00	....
Oysters	9.00	2.00	0.06
Eggs.....	12.50	12.10	0.05
Wheat flour.....	10.50	1.10	74.00
Rye flour.....	10.20	1.50	73.50
Rice flour.....	6.90	0.65	79.00
Wheat bread.....	7.05	0.45	56.50
Graham bread.....	9.00	1.00	50.00
Rye bread.....	6.00	0.50	48.00

Potatoes	2.00	0.15	20.00
Spinach	3.50	0.55	4.50
Beans	23.12	2.25	54.00
Peas	23.75	1.85	0.55
Turnips	2.15	9.15	2.00
Asparagus	1.80	0.25	2.75
Cabbage	1.80	0.20	0.50
String beans.....	1.75	0.15	4.60
Celery (root).....	1.50	0.40	12.00
Bananas.....	1.90	0.80	23.00
Grapes	0.60	....	17.00
Apples	0.40	....	13.75

Assuming the analyses of the various food products to be correct, we can readily arrive at their actual nutritive value upon the generally admitted basis that a gram of albumen is equal to about 4.2 calories, a gram of fat equals 9.3 calories, and a gram of carbohydrates 4.1 calories. To adjust the nutritive balance accurate calculations based upon careful experiments have been made for healthy individuals during physical and mental labor as well as during rest. But for obvious reasons they cannot be directly applied to the sick. In nourishing a sick person we have to take many other things into consideration, especially the presence or absence of fever, the state of the nervous system, the integrity or disease of the digestive apparatus, the state of the circulation, the amount of sleep, the presence of pain, etc., which all have an influence in promoting or retarding normal digestion and assimilation. Actual disease of the gastro-intestinal tract must necessarily complicate any attempted calculation still further, and in practice the diet of the patient will have to be adjusted to the apparent necessities of the particular case in hand.

We have already seen that a certain amount of albumen must be supplied and that 30 to 60 grams are absolutely needed for balancing the nitrogenous waste. Presuming that 60 grams are given, which equal about 250 calories, and a person at rest requires about 2000 calories, the remainder must be made up from fats and carbohydrates. Albumen can to a certain degree substitute fats and the latter can serve to indirectly substitute albumen, while carbohydrates may be used to replace fats if albumen is given in sufficient quantity. Fats having about double the caloric value of albumen or carbohydrates, they are properly taken advantage of when albumen in larger quantities is refused or when the bulk of carbohydrates becomes excessive; hence their importance in the diet-

ary of phthisical patients who are free from fever and gastro-intestinal complications and in whom we desire to supply nutrition in excess.

When considerable fever is present and with certain affections of the gastro-intestinal tract, large amounts of fats are refused by the patient and when given they cause evidence of indigestion. In such cases we must particularly seek to increase the amount of albumen, because carbohydrates in ordinary forms are, as a rule, too bulky to compensate deficiencies. (Cane sugar in considerable quantity is inadmissible because liable to seriously derange the digestive organs.) As concentrated carbohydrates we should, however, think of milk sugar, which is less liable to cause fermentation, and particularly of maltose, which is present in large percentage in the concentrated malt extracts; and with their aid we can, as a rule, supply enough carbohydrates.

The ratio of the essential food constituents as it exists in milk has universal endorsement and any other ratio, especially during a chronic illness like phthisis, will sooner or later be found unsatisfactory. In making this statement I do not wish to convey the opinion that we cannot temporarily deviate or that either one or the other cannot be given in excess, but rather that in feeding the sick or well for prolonged periods this ratio should be present for the minimum number of calories which are necessary to maintain the nutritive balance. Three thousand, five hundred grams (equal to about seven pints) of good milk contain about 105 grams of albumen, a like weight of fat and 150 grams of carbohydrates (which, expressed in calories, is equal to 440, 975 and 615, or a total of 2030 calories), an amount which practical experience confirms to be about right for an average adult at rest.

This proper ratio of food constituents as well as the digestibility of milk have always made it the most desirable food for the sick, and when for any reason milk cannot be given, the nearer we can approach this ratio and digestibility the better do we find the results.

Whenever milk cannot be given in adequate amount and when sufficient amounts of fats and carbohydrates as they occur in ordinary foods are refused, or are not digested by the patient, we have occasion to look for substitutes or additions, and one or the other of the various food preparations under consideration finds then a legitimate use.

In the light of their analyses any physician can make his choice, in which, however, he must further consider the palatability as well as the availability from the standpoint of ease and completeness of digestion and assimilation.

The 20 or 22 grams of albumen which are present in 100 grams of

lean raw meat will suffer some loss in the process of their digestion, and it is not probable that the entire amount will become converted into albumose, even if the beef is tender and if eaten and well masticated by a person in vigorous health. If a like amount is given in a very fine state of division, as it is in tropon, or if it is given in the converted albumose, the loss, if any, is very slight and probably there is no loss at all. The like is true with regard to ordinary fats when we compare them with emulsified or pancreatized preparations, and with carbohydrates in their original form in cereals, flour and vegetables, as compared with forms that present the starches free from vegetable fibre already converted to a degree that but little or no digestive action is necessary. The loss is particularly liable to be considerable with tough meats and coarse vegetables, and when mastication is but indifferently performed.

Bearing these general principles in mind and finding it necessary to resort to artificial food preparations, we must first determine if we need albumen, fats or carbohydrates, or all of them, and we can do this readily and also determine the amount if we know how much is taken by the patient in his present diet by consulting the foregoing table and the analysis of the prepared foods, which any manufacturer will readily supply.

If the question is one of giving the food in greater concentration rather than to supply nutriment ready for assimilation, the non-digested foods deserve preference if for no other reason than for the one of cost. If in a chronic case, we have to consider the question of anaemia, a food that supplies hematin or organic iron should be preferred, while in gout or Bright's disease the preparations whose proteids are obtained from milk should have the preference.

Only when the digestive power is so greatly reduced that ordinary and specially prepared foods cannot be digested is there a real indication for the more expensive predigested laboratory products.

Such a state of the digestive apparatus may result after severe surgical operation, through reflexes, as in peritonitis, or under great degrees of general exhaustion, especially during and after acute diseases when these predigested preparations may become indispensable for the patient's maintenance and for serving the purpose of paving the way to the gradual resumption of the ordinary diet.

Periods of this sort may occur in phthisis, particularly in the acute inflammatory febrile course and with severe gastro-intestinal complications, and when present the question of cost is no longer a consideration.

In estimating the actual food value of non-predigested foods in the

light of their cost the reader should bear in mind the source of their constituents and the amount that is probably available after their digestion is completed.

Beef preparations and those derived from blood naturally cost more than those obtained from skimmed milk or cereals; vegetable fats are cheaper than butter or cod liver oil; like differences in cost occur in the various sources of the carbohydrates. The preparations which supply the greatest amount of calories for a given cost are, as a rule, such as come from raw material which is comparatively cheap, and when not converted by partial digestion and separated from indigestible residue, the actual nutritive value is correspondingly low. The number of calories which raw foods are credited with in comparative tables show only the *possible* but not their *actual* value to the organism to be fed.

It would extend this section beyond my available space were I now to give the analyses of only a tenth of the numerous commercial food preparations and to describe them in the light of the claims of their manufacturers. To give the clinical data which are found in medical literature in support of their practical value would require a large book. I therefore append an analysis and description of only a few from each group, choosing those with which I am personally familiar:

Beef teas, extracts and juices of beef.—These may be made fresh when required. Their chief therapeutic value is the stimulating effect of the extracted meat bases. Their food value is comparatively small. Beef tea made by heating the raw beef in a bottle without water contains from 2 to 3 per cent. of albumen and like beef bouillon serves rather as an appetizer and stimulant than as a food. Bouillon contains usually but a small fraction of one per cent. of albumen. Most of the beef juices now in the market have no material advantage over the juice expressed when needed from fresh, lean, raw beef or from such as has been slightly broiled. Few of the commercial preparations contain more nutriment than is contained in an equal amount of skimmed milk and the practice of feeding a patient a few ounces a day of such a preparation in the belief that actually a considerable amount of nourishment is supplied needs to be reconsidered, since that amount would scarcely supply more than five grams of albumen, a quantity that represents about 20 calories, and which in the feeding of a patient is insignificant. We see, therefore, that so far as food is concerned these preparations can only be given upon the principle that a very little is still better than nothing.

Of the best preparations of this class in the market is Wyeth's beef juice, the analysis of which is as follows:

Water.....	58.85 per cent.
Salts.....	15.54 per cent.
Organic substances.....	25.61 per cent.

Of the latter 19.95 per cent. are nitrogenous substances, which consist of albumen and haemoglobin 2.83 per cent., peptone and albumoses 2.69 per cent., meat bases 14.43 per cent. No preservative is used, the salts naturally present in the meat being sufficient to prevent decomposition. Its food value, like that of similar preparations, depends not only on its contained food value, but also upon the stimulating effect of the meat bases and upon the haemoglobin present.

The non-digested preparations of albumen have a greater claim to our consideration when the question is one of actually supplying or increasing the proteids in the patient's diet.

Tropon is one of the most valuable preparations of this class, representing about 90 per cent. animal and vegetable albumen in a desiccated and finely powdered state.

Dr. Aufrecht's analysis is as follows:

Albumen.....	88.76
Salts and ash.....	1.13
Substances soluble in ether.....	0.34
Water.....	9.77

Its fine state of division justifies the expectation and clinical confirmation that it is most readily digested and that the loss in the digestive process is extremely small. It has also the advantage of being comparatively cheap, and is largely employed in my practice. A four-ounce package retailing for 35c. is equal to about 124 grams, which contain 110 grams of pure albumen, representing about 320 calories. To obtain a like amount from fresh beef we require about 18 ounces, or four and one-half times as much in weight. The preparation is tasteless and free from odor; being insoluble in water, it should be rubbed up with a small quantity of whatever fluid we desire to give it in, making it first into a thick paste and then adding the remainder of the fluid with constant stirring; or it may be added to other foods, even without the knowledge of the patient.

Plasmon is another albumen food of great value, belonging to the non-digested class. It is the dried and powdered casein from skimmed

milk and represents about 75 per cent. of pure proteid. Its analysis is as follows:

Proteids.....	74.54
Fats.....	1.75
Carbohydrates.....	2.75
Ash.....	8.39
Moisture.....	12.57

One hundred grams (about 3 1-3 ounces) represent 541.5 calories and cost 20c. The simplicity of its manufacture without objectionable chemical treatment assures us that the preparation represents the proteid from milk in an unaltered form. Tunnicliffe and Rosenheim (1) have shown its digestibility to be at least equal to that of ordinary milk and that when the latter cannot be given in large enough quantity its food value may be augmented at pleasure by the addition of plasmon. Being tasteless and odorless and soluble in water, it can be administered in a great variety of ways, alone or as an addition to other foods. The milk proteids being free from nucleins, which form uric acid, this preparation should have preference when chronic or acute nephritis, tuberculosis of the kidney or amyloid degeneration are complications in the course of phthisis. Another advantage is its relatively low cost of \$1.00 per pound, which enables us to supply albumen almost as cheaply as we can from beef.

Bovinine contains the proteids and haemoglobin from blood less its fibrin, and is reinforced by the addition of 19 per cent. of desiccated egg albumen. The following analysis is supplied by the manufacturers:

Defibrinated bullock's blood.....	65 per cent.
Desiccated egg albumen.....	19 per cent.
Old Bourbon whiskey.....	10 per cent.
Chemically pure glycerine.....	5 per cent.
Boracic acid.....	1 per cent.

The solid constituents of the blood minus fibrin are the most important part of this food and give it a peculiar value. If we inquire into its nutritive value we derive from 65 parts of blood 12.3 per cent. of proteids and 1.3 per cent. of fats; adding thereto 19 per cent. of desiccated egg albumen we have a total of 31 per cent. of proteids and 1.3 per cent. of fats. One hundred grams (about 3 1-3 oz.) of the preparation represent, therefore, 140 calories. The retail price for a bottle of 12 ounces is \$1.00. This preparation has been extensively employed in

(1) British Med. Journal, Oct. 3, 1900.

phthisis and has maintained an excellent reputation for many years. Apart from its food value it should be particularly thought of, whenever anaemia is a factor in a given case, as supplying haemoglobin as well as the other mineral constituents of the body.

Murdock's liquid food is also a blood preparation and is said to also contain the juices of fruits and to be free from other preservatives. According to its published analysis it contains:

Albumen.....	11.10 per cent.
Alcoholic extracts.....	1.97 per cent.
Ash.....	0.42 per cent.

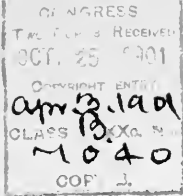
I cannot quite understand how fruit juices in their unfermented state can act as a preservative of blood, and the literature supplied by the manufacturers does not throw any light on this question. A twelve-ounce bottle costs \$1.00. As all fruit juices contain carbohydrates and 2 per cent. of fats are present in the blood, I miss their mention in the supplied analysis, which evidently is incomplete.

Michaeli's Cocovena is a whole food without predigestion and at the same time an agreeable beverage which is of late attracting considerable attention. It is a preparation of cocoa and oats and according to the published analysis contains:

Nitrogenous substances.....	17.47
Fats (oil of theobroma).....	18.77
Carbohydrates.....	48.34

It will be noted that the food constituents are supplied in proper ratio. Its cost is 50c. for 1 lb. (500 grams), which is moderate for the amount of nutritive substance supplied. It has the agreeable taste and flavor of cocoa and serves a valuable purpose in that class of phthi-ical or other patients who need additions to an ordinary diet without materially increasing the bulk, and whose digestion is not impaired. It can be added to milk for increasing its food value and palatability and for varying its taste. It also is very convenient for feeding between meals and for alternating with other foods. According to the above analysis 100 grams are equal to about 445 calories, which cost the consumer 10 cents

[TO BE CONTINUED.]



THE JOURNAL OF TUBERCULOSIS.

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ORIGINAL CONTRIBUTIONS.

THE SKIRMISH LINE OF INCIPIENT TUBERCULOSIS.

BY J. H. TYNDALE, M. D., LINCOLN, NEBRASKA.

To avoid spreading myself over too wide a field, what follows is intended to elucidate tuberculous conditions in the lungs and pleura.

We all know that the solution of the problem as to whether or not tuberculosis exists in a given case, has not been brought about by Koch's discovery of the bacillus. Early, very early diagnosis calls for the recognition of closed foci in the lungs or pleura or both, in cases where there is no cough and no expectoration.

I quote from the last number of the Journal of Tuberculosis "On the Early Diagnosis of Pulmonary Tuberculosis."

"Weicker also agrees with Knopf that the tuberculin reaction is not available in the diagnosis of human tuberculosis. The public views with suspicion the exhibition of a substance which can produce fever and sensations of discomfort; and some individuals even blame the development of the disease itself to the diagnostic injections made early in its course. Besides, many practitioners do not recognize the trustworthiness of this substance in establishing a diagnosis."

Thus far the Roentgen rays have added nothing of special value to older methods of physical exploration.

We are therefore compelled to fall back on auscultation and percussion for ascertaining the local condition and on well founded rules to sense the general condition—notably anaemia, emaciation and loss of muscular power—and to combine the two for a verdict as to the existing condition. It goes without saying that no one objects to displacing a diagnosis in the rough by more exact and well defined methods.

Not many years ago, these features were requisite for a diagnosis of an incipient tuberculous invasion; marked and rapidly progressive anaemia, alarming emaciation and loss of muscular power—all advanced

to the point where a person with half an eye could see that the individual afflicted was on the down grade at sixty miles an hour.

Secondly we had the râles, the great sheet anchor for medical men of defective hearing and inability to note changes of pitch.

Note right here that at that period patients were close upon the death limit before their condition could be established.

By gradual progression we arrived at a point where marked changes in pitch were established, as premonitory signs in connection with the general decline of nutrition. Still the auscultatory finding had to be "marked," well defined, appreciable to the ear of any one totally unfamiliar with music or without any idea of what really constitutes "pitch."

Still this was a decided step in the right direction.

We have all come across persons who prefer to undergo the tortures of intestinal fermentation, rather than become civilized enough to abjure corn bread and New Orleans molasses. By the same token, it is difficult, yes, almost impossible, to convert rôle worshipers to the new order of things.

What do I mean by the new order of things? A diagnosis based on joining together the existing general nutrition and the findings by auscultation, the latter based on slight changes of pitch in the vesicular (pulmonary) respiratory murmur and in its absence to be guided by mere changes of rhythm that are not transitory but permanent; finally by exclusion of all other acute or chronic infectious inflammations or disturbances of innervation.

The new dispensation, therefore, seeks to establish the very earliest evidences, the skirmish line of tuberculous invasion in the lungs.

Now what must be the finding in order to clinch such a diagnosis and to be prepared to swear to it and to institute proper treatment.

1. Progressive and persistent anaemia, unaccounted for by other invasions of infection, inflammatory processes, central or peripheral nervous disturbances or, last but not least, stubborn stomachic or intestinal indigestion. This latter element should always be removed before a diagnosis is ventured upon.

It is this factor that accounts for persistent rises in temperature in a large number of cases.

This article is not a text book for teaching how to gauge anaemic conditions from first beginnings to the highest grade of perniciousness.

2. Progressive and persistent emaciation demands the same exclusions as recorded above. Frequent weighings alone are to be relied upon, not the opinion of the patient nor that of his friends. One great feature

in rapidly progressive emaciation in tuberculosis is too frequently lost sight of. It is this:

There is one very important point—and not a new one either—to which attention cannot be directed too frequently. Innumerable post-mortems in tuberculous cases have shown the *entire occlusion of the thoracic duct curve at its entrance into the left subclavian vein by tuberculous nodes*. This cuts off the main chyle channel from the lymphatics to the blood vessels and is in itself enough to account for rapidly progressive anaemia and emaciation.

3. We now come to diagnosis of the very earliest manifestations by auscultation and percussion. I name auscultation first advisedly, for no one but a barbarian will nowadays make percussion anything but a means of confirmation of the auscultatory finding.

Let me try to be as clear and explicit as possible. As stated above, in former days râles were considered the *sine qua non* of diagnosis. Then followed the changes in quality (“tonality” it should be called) from vesicular to bronchial respiration. The next step brought with it recognition of differences of pitch, as indicative of the earliest incipency of tuberculous invasion of the lung tissue.

Go a step farther now and do what I have done for a number of years and in years gone by endeavored to instill into the minds of colleagues thirsting after knowledge in the New York Polyclinic. Seek for the first manifestations of tuberculous invasion *in changes of rhythm in breathing* and do not wait for changes of pitch.

Rhythm is the regular recurrence of accents; the characteristic of regular succession. The rhythm of breathing in the normal condition of the lung is a regular succession of marked accents. It consists, as we all know, of inspiration, a pause and expiration—what in music would be called a three part rhythm.

The rhythm of respiration is a *continuous* movement (*legato*) while that of the heart is an *interrupted one* (*staccato*).

A change from the continued to an interrupted rhythm marks the earliest beginnings of a pathological condition in the lung, both in infections and inflammations; always providing that this change of rhythm is not temporary, but permanent, that it occurs in connection with progressive anaemia or progressive emaciation or both, and that other disturbances of a functional character can be sharply excluded.

Lastly, what are the persisting changes in rhythm that should command attention as the skirmish line of tuberculous infection of the lung?

What does normal respiration call for? An audible inspiration of

pulmonary (vesicular) quality, a pause which is only a "retarde" and a short and inaudible expiration. Well, the pathological changes are the reverse of this. They call for an interrupted rhythm, a broken accent—that which in the music of the present day is known as "rag time."

We may have an interrupted inspiration (as yet without change of pitch or quality), that rhythm which ancient mariners still call "cog-wheel" respiration, or there may be nothing but a distinct and prolonged pause. Again we have of old the prolonged and audible expiration. When all three are combined diagnosis is comparatively easy.

It goes without saying that the percussion finding gives no clue to the existing condition, save in confirming by its normality that no organic changes leading to alteration of pitch or of quality have as yet taken place.

ON THE USE OF ALCOHOL IN PHTHISIS.

BY EDWARD PREBLE, M. D., NEW YORK CITY.

The comparatively recent discovery, based upon statistics, that alcoholism is a potent determining cause of consumption, has naturally exerted considerable influence upon the therapeutical position of alcohol in the treatment of this disease.

The belief in vogue a generation since, shared and taught by Flint and others equally eminent, was that alcohol was a sort of specific for phthisis in all cases where no intolerance to the remedy existed, and where its immediate effects appeared to be wholesome. The custom of telling the patient with incipient phthisis to "drink all the whiskey he can" is still widely prevalent and is regarded as heroic intervention suited to a desperate condition. Since the disease is so commonly held to be fatal, it is natural to resort to extreme remedies.

Most of us have seen cases apparently snatched from certain death by a resort to alcoholics, although such an experience is relatively infrequent. These survivors, in the majority of instances, tend to persist in the use of the saving remedy and are probably not long lived as a class. We sometimes hear the expression, "whiskey saved his life but killed him later on." If phthisis be regarded as a necessarily fatal disease, prolongation of a life for a decade or two would have to be recognized as a triumph of therapeutics, however repugnant the free use of alcohol may appear to a large proportion of the community.

But in the meantime we have gradually been learning that phthisis

is by no means necessarily fatal and that it may even be classed in its earlier stages as an essentially curable affection. This being admitted, it seems reasonable to infer that the type of case which is amenable to cure by alcoholics would yield with equal readiness to any other plan of treatment which would produce physiological effects similar to those induced under favorable circumstances by beer and spirits; viz.: increase in appetite and digestion, in sense of well being, in nervous and vascular tonus, etc.

The gradual realization of the fact that phthisis is amenable to recovery under such agencies as rest in bed, out-door existence, sanitarium life, forced feeding, respiratory gymnastics, etc., tends to do away with the idea of dependence upon exclusively specific remedies such as codliver oil, hypophosphites, creasote and alcohol, the latter of which would doubtless have shared the fate of all alleged specifics in time, even if its use were attended by no drawbacks.

Side by side with the acceptance of the dogma that phthisis is essentially curable by combined hygienic resources, we find the conviction that alcohol is actually one of the leading causes, if not the chief determining factor, in the production of phthisis in some civilized countries. The credit for this demonstration does not belong to the unreasoning agitation of professional teetotalers, but to a consensus of opinion among the representative medical minds of France who are genuinely alarmed by the out-look in their native land. The greatly increased per capita consumption of spirits and spirituous essences in recent years among a naturally temperate people has been shown beyond doubt to be responsible for a great increase of phthisis in certain localities. This influence is not so readily apparent in races which have been hard drinkers for centuries, but there can be little doubt that the same cause is everywhere in operation.

The question now arises, "What is the modern field of alcohol in phthisis?" Fortunately it is readily answered, for references to the authorities of to-day in various countries show a remarkable unanimity of opinion. A great change has been wrought, but it affects the dose rather than the principle of exhibiting the remedy. For Flint's spirits ad libitum and Dettweiler's daily bottle of wine reinforced by stiff drinks of brandy, we have only to substitute the minimum physiological dose to get the modern status of alcohol as a remedy in phthisis.

The physiological action of alcohol is well known. It checks nitrogenous waste, promotes appetite, in small doses accelerates digestion, facilitates the putting on of fat, and slightly reduces temperature.

It stimulates the heart and nervous system and favorably influences night-sweats and insomnia.

Alcohol should therefore be a valuable remedy in phthisis, if all possibility of abuse is guarded against. All depends upon quality and dose. Now, as formerly, tolerance is an essential point, and the use of the drug should be forbidden to all in whom its action goes, so to speak, against the grain; and this prohibition includes all children. Patients may exhibit intolerance to malt liquors and yet derive benefit from spirits; even the season of the year plays a part in relative tolerance;—for malt liquors seem to be more acceptable to some individuals in the hot months. It is generally agreed that alcoholics are best taken while eating, and if spirits are required between meals, they should be given in the form of egg-nog and milk-punch. As a general proposition all spirits and strong wines should be given diluted.

Under certain circumstances alcohol is contraindicated even in the absence of intolerance. Its use is generally believed to be inappropriate after hemoptysis, or perhaps in cases in which repeated hemoptysis is a feature. In the gastritis which not infrequently accompanies phthisis, alcoholics are necessarily out of place. In cases of phthisis in which cough is unusually distressing, the use of alcohol may or may not be contraindicated. Williams, the English expert, finds that the various alcoholics exert a different influence upon cough, and that good claret may be borne in these cases when other forms of stimulants produce irritation. Upon this point experience alone must be our guide.

The old idea of heroic or at least of considerable doses of alcohol seems to be retained only in connection with the last stages of phthisis, when the extreme debility and tendency to fatal syncope may be antagonized by the exhibition of spirits *pro re nata*, given as a bracer. One eminent authority sanctions the use of a rum punch upon rising, as the patient is thereby enabled to dress without fatigue. It is likely, however, that this teaching originated before the necessity was recognized of rest whenever fever is present.

Due latitude being given for the contraindications and exceptions just enumerated the routine employment of alcoholics in phthisis appears to be given in a representative manner by Cornet who limits the patient to about four ounces of port or sherry, or a proportionally larger quantity of lighter wine *per diem*, given in one or two portions at noon or noon and evening respectively. If malt liquors are better borne, one good sized glass of English stout, or

of strong German beer (Münchener, Culmbacher, etc.) should be allowed some time during the day, and if given on retiring these preparations appear to favor sleep.

Generally speaking alcohol is no longer given in phthisis when the indications can be filled by other remedies.

THE MODERN TREATMENT OF TUBERCULODERMATA.

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In the present essay the writer intends to embrace the modern treatment of tuberculodermata, without dwelling at length upon the pathology and diagnosis of these dermatoses, except, of course, an incidental demonstration here and there for elucidation of the subject as occasion may indicate.

Many an affection of the integument has been regarded heretofore as being due to a legion of extrinsic and intrinsic causes other than microbic. In the past decade of advanced bacteriologic investigation however, and also at the beginning of the current century, the importance of microbism as a direct etiologic factor has been recognized by competent clinicians and dermatologists. Not alone invasion of microbes *per se*, but also their metabolic products, their toxalbumins have received the consideration they adequately deserve.

In an article entitled "A plea for Stricter Attention to Tuberculodermata," read before the American Congress of Tuberculosis and published in the Medico-Legal Journal, June, 1901, the author has had opportunity to express the foregoing in more succinct terms, demonstrating the microbic origin of a number of cutaneous diseases. He emphasized the view of the French and Italian Schools of dermatology, to wit: *that all skin diseases with but few exceptions are due to the action of microorganisms.*

This view of late has been corroborated by the leading dermatologists of America.

The author, however, ventures to proceed a step farther and attributes a great number of skin diseases to the action of the tubercle bacillus. The dermatoses belonging to the domain of the latter are

lichen, eczema, scrofuloderma, lupus, leprosy and ecthyma. To prove the correctness or at least the feasibility of this assumption, the following points may serve as criteria.

(a) Lupus is *always* due to the bacillus tuberculosis.

(b) Scrofuloderma and eczema, especially the infantile variety, are in many instances attenuated forms of a general tuberculous dyscrasia; the bacillus tuberculosis and other microorganisms have at times been detected in the multiple and manifold lesions, as well as in the exudative and serous products of these affections.

(c) The tubercle bacillus has a striking resemblance to the bacillus of leprosy and

(d) Ecthyma and lichen are the result of a mixed infection in which tubercle bacilli have been found.

To argue therefore, from the above, it would seem that the diseases enumerated are akin to one another, at any rate, have a common origin. Future research will reveal in how far the above affections are related to one another and determine beyond doubt that their exact nature and primary cause is nothing else but tuberculous, and that *the majority of dermatoses are of a tuberculous nature.*

So much for the etiology and common origin of the tuberculous diseases of the skin. The next of importance which demands our thorough consideration and entire attention is the treatment of these affections. This may conveniently be studied under the following four headings:

(a) Prophylactic Treatment.

(b) Dietetic and Hygienic Treatment.

(c) Mechanic or Local Treatment.

(d) Constitutional or General Treatment.

PROPHYLACTIC TREATMENT.

Every physician and dermatologist should report cases of tuberculodermata, especially those six enumerated, to the local health authorities. Immediate segregation of those suffering from leprosy and lupus should be carried out to the fullest extent. Scrofuloderma, eczema, ecthyma and lichen should receive efficient and prompt disinfection without isolation.

It is hoped that by the enforcement of these prophylactic measures the spread of tuberculodermata may be minimized and thus a great menace to the community spared and eradicated.

DIETETIC AND HYGIENIC TREATMENT.

Patients suffering from tuberculodermata are usually of a depraved physique and their vitality and power of resistance to other inter-current affections are below the norm. As a general rule the amount of carbohydrates should be restricted, since, in the primae viae, they give rise to butyric and caprylic acids which are reflexly conducive to disturbance in the equilibrium of the vaso-motor apparatus, which disturbance, in turn, (by the ensuing relaxation of the cutaneous vessels and consequent increased exudation into the papillary layer of the corium) aggravates the local lesions.

Pickled articles should be absolutely omitted from the diet. Milk, buttermilk or koumyss alternated with eggs and meat (that of young fibre preferably) are very wholesome and nutritious. If the digestive function is intact, fats merit the most prominent place as articles of diet in all tuberculous affections, and their consumption should be encouraged. It should be borne in mind that alcoholic beverages and malt liquors in any form are injurious and contraindicated in the tuberculous diseases of the skin. If given at all, they should be given very sparingly. Proper apparel to suit the demands of the season and weather must be worn. Outdoor exercise is very beneficial; so is plenty of sunshine, or as Osler says, "*the maximum amount of sunshine.*"

The value of baths in tuberculous dermatoses should not be over estimated, as many writers are apt to do. Doubtless some of the chalybeate, alkaline and especially the so called "slime" baths are of immense value in a certain number of cases. But in instances of general, disseminated or confluent forms of eruption the propriety of balneologic measures can not be entertained.

MECHANIC OR LOCAL TREATMENT.

This heading embraces the most important and efficacious mode of treatment. It comprises the happy results obtained from the exposure of the tuberculous lesions to the action of mechanical agents and certain physical forces, with a view towards their destruction and final eradication. The discovery of the *Roentgen* and the *Actinic* or *Finsen's rays* has been met with favor by all eminent dermatologists and hailed as a new era of rational and effective therapeutic procedure. They are now being employed exclusively at the expense of the so called anti-septic agents. The galvanocautery may also be used in rebellious forms of lupus, but its applicability, since the introduction of the Roentgen's and Finsen's Light is rather limited. It savors of barbarism as compared to the less painful and more efficient effects of the ray treatment.

Painstaking efforts should be made to have the diseased surface properly and thoroughly exposed to the penetrating action of the rays, lest the result be evanescent and far from satisfactory. Two exposures weekly, for a time, suffice as initiatives, after which the sittings may take place more often.

Local antiseptic medication should not be altogether slighted or discarded, as it forms a valuable adjuvant to the ray treatment. Ointments or lotions of mercuric bi-chloride, 1 in 8,000 or 10,000, or the ointment of hydrarg. ammon. of 5 per cent. strength; iodoform or iodine in ointment or solution; phenol in the same form; hydrogen dioxide or hydrozone, ichthyol, *ethyl chloride*, salicylic and benzoic acids in any convenient form; cinnamic acid or the essential oil of cassia in alcoholic solution or ointment, or a combination of several of these remedies, are important auxiliaries. The actual cautery, curettement and cauterization of the lesions with the various escharotics, notably caustic soda and potash, argentic nitrate or chromic acid should never be undertaken. The loss of tissue incurred by their employment, the deformity following and the pain accompanying their application does not warrant their introduction as routine measures. As long as we possess the *X-Rays and Finsen's light*, we should keep ourselves at a distance and aloof from the application of these destructive means.

Recently, the fluid extract of ergot, or ergotin, with the extract of the suprarenal gland, injected into and at the margin of the lesion, has been practiced by French dermatologists in cases of *lupus*, and the results obtained are indeed very satisfactory. An extended trial, however, is necessary to determine the value of and contraindications for this particular mode of treatment. It is very probable though, that the active principle of the gland—*adrenalin*—may have something to do with the neutralization and destruction of the morbid material.

Topical injections and applications of tuberculin or the aqueous extract of tubercle bacilli, have of late been tried in Germany, but the results obtained from this treatment have not been published as yet. Whatever mode of treatment may be adopted, the paramount utility of the ray treatment should ever be borne in mind in all cases of tuberculodermata.

CONSTITUTIONAL OR GENERAL TREATMENT.

It is very erroneous to attribute to any medicinal agent a special or particular action upon tuberculous processes. The only influence they exert upon the economy consists in enhancing the physiologic power to resist the ravages of tuberculous invasion. They aid assimilation

and promote nutrition, thereby rendering the tissues less susceptible and lowering their vulnerability to further bacillary attacks.

The following constitutional remedies are of value in the treatment of the tuberculides: Cod liver oil, the hypophosphites, malt, creosote, arsenic, iodine and the subcutaneous injections of tuberculin or the aqueous extract of the tubercle bacillus.

Cod liver oil is of undoubted efficiency in improving the nutrition and tone of the body. It should be given in small doses at the start, in order to accustom the stomach to it. In infantile eczema and scrofuloderma it acts almost as a specific. If the oil can not be well borne cream may be substituted for it. The oil should always be administered in the form of an emulsion alone, or in conjunction with the hypophosphites and iron iodide.

Malt with cod liver oil is a valuable combination, especially in persons of perverted intestinal digestive function.

Next to cod liver oil in point of efficiency stand the hypophosphites. They are but tonics and exert no antiseptic action whatsoever upon the tuberculous formations, as has been supposed heretofore.

The syrup hypophosphite compound, containing the hypophosphites of lime, soda, potash and iron, is a pleasant form in which to exhibit them.

Next in order are the various preparations of malt or maltine, either alone or in combination with the iodides, hypophosphites, cod liver oil, creosote, etc.. Besides the tonic action of the malt, it also promotes intestinal digestion by virtue of the diastatic principle it contains.

Creosote is the next drug demanding our attention. It is best administered in capsules beginning with one minim three times a day and increasing the dose gradually until eight or ten minims are taken.

If not well borne it should be immediately discontinued. It may be also given in an alcoholic solution and flavored with comp. tinct. of cardamon.

Creosote in a vehicle of almond oil may be also injected into the tuberculides or painted upon the eruption.

Guaiacol, or morrhual creosote may be given as a substitute for creosote. They are constitutional antiseptics, exerting a beneficial influence over the local lesions and augmenting the process of repair.

Arsenic is a valuable tonic alternative in the chronic form of tuberculous skin affections. It has a selective action upon epithelial structures, especially upon cutaneous epithelium, exercising a stimulating and reconstructive metamorphosis upon the epidermis.

Finally, the hypodermic treatment of the tuberculodermata with tuberculin and the aqueous extract of tubercle bacilli should be given a thorough trial, as there are cases on record wherein this treatment has proved efficacious.

In conclusion, the author wishes to emphasize the fact that the various tuberculides are merely a local indication of a general tuberculous dyscrasia or a cutaneous manifestation of the undermining destructive, imperiling and ravaging action of the tubercle bacilli, which insidiously break the barricade established by our friends, the phagocytes, and which may at any time favor the entrance of a pulmonary, meningeal, or peritoneal tuberculosis. It is our imperative duty, therefore, to treat the tuberculides just as we would treat cases of tuberculosis of other organs. It behooves us to employ all possible means, whether prophylactic, mechanic, or medicinal, to ameliorate or palliate those cases which are beyond the portals of cure, and to eradicate those which are in their incipency; to direct our efforts and ardent endeavors towards the prevention of that scourge which is but rightly termed the "White Plague" of mankind.

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ORIGINAL TRANSLATIONS.

ON HUMAN AND BOVINE TUBERCULOSIS.*

BY RUDOLF VIRCHOW, IN BERLIN.

(ADDRESS DELIVERED BEFORE THE MEDICAL SOCIETY OF BERLIN, JULY 27, 1901.)

Gentlemen: I wish, before the order of the day, to make an observation in regard to the discussion of human and bovine tuberculosis which has just taken place in London.

In the publications which have appeared in the meantime, all sorts of things have been said for and against the conception of R. Koch. Quite correctly Lister's expressions of doubt have been placed in the foreground. Also in the "Berliner Tageblatt" which came to my notice this evening, it has been pointed out that control experiments in man are lacking, and that these must indeed be waited for. On this occasion it has also been stated that the honor has been conferred on me, to be a member of the committee of investigation, ordered on the part of the Government. One needs only to wait until the true observations are published, which I must leave to the Government Commission. Personally, I can directly contribute nothing. But I will state that the still necessary investigations have been discussed in greater detail in the conference which the Imperial Health Bureau has brought about, and in which the tuberculosis experts of Germany have taken part.

A long list of new demands have been formulated which, you, gentlemen, may consider too many. But in so important a question it appeared necessary to open the doors to every possibility of observation. For my part, I may verify the fact that the preparations from the experiments which were conducted in the Veterinary School, under the special direction of Professor Schütz, and under the control of Professor Koch, and which were exhibited in the hall of the conference, offered, according to my conception, no occasion for the belief that they failed in the aim for which they were intended.

By these, the fact has been demonstrated that, infectious masses which, with great care, were obtained from the products of human tuberculosis, had produced in the animals experimented upon no evidences which could be compared with bovine tuberculosis,—the so called perle disease.

As regards the transmission of bovine tuberculosis to man, naturally no experiments have been made; for these we must await

*Translated for the Journal of Tuberculosis from the *Berliner Klinische Wochenschrift*, for August 5, 1901, by Dr. H. H. Waite of Asheville.

future opportunities. I will only observe, in this connection, that Prof. Koch has perhaps gone too far in the exclusion of all those cases in which the transmission of bovine tuberculosis to man, might possibly have taken place through food. As a matter of fact, we have had, from time to time, an occasional case in the material of the Charité and several specimens have been preserved which showed a very unusual evidence of peritoneal tuberculosis, and in which there were found such enormous growths as do not usually occur in man. We have regarded every such case as suspicious and we still continue to do so. Therefore, I deem it possible that the negation of Koch may perhaps admit of refutation in the future. On the other hand I do not hesitate to acknowledge what Koch has said in his report based upon recent experiments, the thesis of which I quote. "With justification do I make the statement that human tuberculosis differs from bovine tuberculosis and can not be transmitted to cattle."

But in this there are two theses; namely the difference between the two tuberculoses and the question of the possibility of their transmission. As regards the latter question I have already told you that the material presented bears witness. In connection with the other point—namely that the two tuberculoses are distinct—I was not surprised to hear that Prof. Koch had finally convinced himself that they were two different things, even after my old thesis (1) containing the same statement has been regarded by the Koch school, for a considerable length of time, with a certain contempt; and I have borne their judgement with patience. I certainly have never understood how any one could maintain that the two were identical. I might remark here that it seems to me that we cannot call anything tuberculosis in which tubercles do not grow in that form by which they prove themselves, pathologico-anatomically, true tubercles; but not everything in which tubercle bacilli are found should be called a tubercle, offhand.

A great many of the difficulties which have arisen for the public and especially for physicians are due, in my opinion, to this mistake of confusion, for if we could not agree absolutely upon what should be called a tubercle it was impossible to make a clear and generally comprehensive statement which would be final.

In this connection, I take the liberty again of emphasizing to you that, according to my conception, a tubercle is not merely a thing in which there are tubercle bacilli, but is built up of cells which we

(1) Man vergleiche darüber meine Darstellung (1863) von der Perlsucht in meinem Geschwulstbuche, Bd. II, S. 736, 741, 745.

call tubercle cells, that is, there is present in the tubercle an organization, a structure which has grown out of its own body even though it may have arisen by the irritation of tubercle bacilli. But tubercle bacilli proper are not a productive (formative) element in themselves; the formative element must be cells which have been produced from the living body itself.

You will remember that I have repeatedly emphasized the distinctions between mere bacillary and true tuberculous products. I shall not repeat them now, but shall only say that the differentiation is not new to me. You must consider that more than ten years have passed during which we have been subject to a delusion, as Koch himself admits. If we do not want another ten years to pass in the same delusion, we must make up our minds to distinguish with greater care these things which are different, and to keep primarily in mind, not the bacteriological, but *only the true pathological tubercle*.

The difficulty in the way of a clear differentiation is principally that we believed we could call a structure containing the bacteria in question, a tubercle without further investigation. In this manner, not only bovine tuberculosis, and lupus in man have come into the foreground of our consideration, but what was a much more salient error, even the anatomical wart has been considered a tubercle because here and there a tubercle bacillus had by chance been found in microscopical sections of an anatomical excrescence of the skin.

This interpretation must not, of course, be repeated in the future.

We must be sure that there are not only bacillary tubercles and bacillary hepatizations, but that there are also non-bacillary forms, and that not everything in which there is a bacillus can be called a tubercle. Rather should we recognize every tubercle as an organic structure which has grown out of the constituent parts of the body. I should like to emphasize this point particularly on this occasion.

Since I have the honor to be appointed to the commission which is to direct further investigations, I promise you that I shall strive to maintain this distinction with the utmost effort, in order to spare you, in the future, the difficulties which have arisen in the past. The public in general will derive much benefit therefrom, and I shall rejoice if it is definitely settled that the tubercle bacilli of cattle are not transmitted through milk and meat and, by who knows what other media, into the human body, so often as is usually represented. It has always seemed to me to be somewhat over-estimated. I have never refrained from drinking milk or eating meat because of the possibility of the presence of a bacillus in either. I have always been of the opinion that it is not

a matter of this or that bacillus, and that if we do not take above a certain quantity of them into the body, the danger is not great. But this question of the quantity has rarely been treated by bacteriologists up to the present time. They go on the premise that, having found only one typhoid bacillus or one cholera bacillus, there must be countless millions of other bacilli of the same kind present. We should be somewhat more cautious, gentlemen, and I promise you that in so far as I can co-operate, I shall insist that the anatomical tubercle have full justice and that we guard against confusing anatomical and bacteriological things.

There is not enough time to touch upon further details, although I might do so. I can only say that I think it will come about very naturally and in a relatively short time, that the preparations from previous experiments, obtained in the Veterinary School, will be accessible to the public. If this vacation should pass before this has come about, I will very gladly make an effort to provide such facilities for you.

THE RELATION OF HUMAN AND BOVINE TUBERCULOSIS.*

BY PROF. P. BAUMGARTEN, OF TUBINGEN.

The question as to the relation of human and bovine tuberculosis which has aroused such universal interest since the address of Prof. Koch at the Tuberculosis Congress in London, (1) has long been the subject of scientific investigation.

The proof, established by Prof. Koch and by myself, of the existence of bacilli, in the characteristic anatomical products of the two diseases, identical in their morphological and cultural properties, as well as in their effect on small animals, appeared definitely to settle the question of identity. Moreover, as has already been mentioned, (2) in this Journal in the year 1893, I have called attention to the fact that a link was still missing in the chain of evidence, as regards the identity

*Translated for the Journal of Tuberculosis by S. H. von Ruck, from the "Berliner Klinische Wochenschrift," No. 35, Sept. 2, 1901.

(1) C. f. die Specialberichte in: Medicinsche Reform, 1901, No. 30, ferner, Berliner Klinische, und Deutsche Medicinsche Wochenschrift.

(2) C. f. Berliner Klinische Wochenschrift, 1901, No. 30, S. 804.

of the two diseases, viz., that of transmission of human tubercle bacilli, perle disease may be produced in cattle. (1)

In this work done by Dr. Gaiser in my institute in 1893, which seems to have become very little known, experiments were made with tubercle bacilli on calves, on the one hand with bovine, on the other with human tubercle bacilli. Unfortunately for the purpose of these investigations, but two calves were available, but the results were nevertheless highly instructive and convincing. In calf No. 1, bovine bacilli were introduced into the anterior chamber of the eye; in calf No. 2 large numbers of human tubercle bacilli from a pure culture were injected, partly into the eye chamber, and partly subcutaneously in the flanks. For control of the potency of the two sorts of inoculated material, a rabbit was infected intra-ocularly, and a guinea pig subcutaneously with human tubercle bacilli. Calf No. 1 developed a typical tuberculosis of the infected eye, and six weeks after the infection death occurred with great emaciation and dyspnoea, which, as the post-mortem showed, were due to a generalized, miliary tuberculosis of the severest type, and without the formation of a single node of perle disease.

On the contrary, in calf No. 2, the point of infection remained almost without reaction; the animal continued healthy in other respects also, and when, after several months, it was killed, not a trace of tuberculosis or of perle disease was to be found, either at the point of infection, or elsewhere in the body. In contrast to this result, the control animals infected as was calf No. 2, (i. e. with human tubercle bacilli), died—although only after five and one-half months—of disseminated tuberculosis.

The failure in calf No. 2 is not to be attributed to the lack of virulence of the inoculated material; on the contrary, it is far more reasonable to infer that cattle are not, or at least are much less susceptible to the bacilli of human tuberculosis than are rabbits or guinea pigs, and a critical review of the literature convinced us that, thus far, no absolutely unimpeachable instance of successful transmission of human tuberculosis to cattle has been recorded.

Koch now, as he tells us in his address, has pursued, on a large scale, investigations concerning the transmission of human tubercle

(1) C. f. Jahresbericht für pathogene Mikroorganismen, Jahrgang VII (1891) S. 666.

Amerkung, sowie die im Jahre 1893 erschienene Dissertation von Dr. Gaiser: Zum Identitätsnachweise von Perlsucht und Tuberkulose (Arbeiten aus d. pathologischen Institut zu Tübingen, Bd. II, S. 368).

bacilli to the bovine species, and indeed with absolutely negative results, while, at the same time, the experimentative transmission of perle disease to cattle has in every instance been attended by positive results.

Koch concludes therefrom that "Human tuberculosis differs from bovine tuberculosis and cannot be transmitted to cattle."

The other infinitely more important question as to whether or not bovine tuberculosis is transmissible to man, Koch considers as not yet definitely settled, although he expresses the opinion that the susceptibility of human beings to bovine tuberculosis is, in any case, very slight, so slight, that he does not deem it essential to continue the measures generally adopted for the prevention of infection through dairy products and flesh of tuberculous animals.

I am, however, in a position to make, what I consider, an important contribution to this question.

Koch observes rightly, that the solution of the problem lies only in experiments upon human beings, which are naturally excluded. Infections of the human subject with tubercle bacilli from perle disease have nevertheless been made, although not with the herein mentioned motive. The physician, Rokitansky, who made the experiment is no longer among the living, and it cannot injure his memory if I make public these experiments, which were made nearly twenty years ago, inasmuch as they can contribute to the solution of a question which affects the weal or woe of the entire human race.

These experiments came to my official knowledge as prosector of the particular hospital in which they took place. They concerned patients, who, on account of inoperable, generalized, malignant tumors, (carcinoma and sarcoma) were inevitably doomed to a painful death.

The idea of bacterio-therapy, i. e., the experiment of healing otherwise hopeless patients by the inoculation of certain bacteria had been previously entertained, and has since been resorted to in many instances of human disease, as for example the attempt to cure malignant tumors by the inoculation of virulent cultures of the germ of erysipelas. Rokitansky had, in his time, maintained, as a fact, that carcinoma and tuberculosis excluded each other. Did not, therefore, the possibility exist of arresting, or perhaps even of curing malignant neoplasms, by exposing them to the influence of the action of the perhaps antagonistic tubercle bacillus? This question the operator propounded for himself, and his affirmative answer gave him the courage for action.

Without confirming this mode of reasoning, I desire here to particularly state that the experiments of our deceased colleague were not made in the pursuit of theoretical knowledge, but were undertaken

upon the practical proposition of a last effort to save otherwise hopeless cases from inevitable death. Furthermore, in this connection, I will add that the experiments neither benefited nor injured the patients.

Having at the time no virulent cultures of human tubercle bacilli available, and acting upon the then current belief in the identity of human and bovine tubercle bacilli, bacilli of perle disease which had proved highly virulent in rabbits were used.

Although considerable quantities of these bacilli were injected subcutaneously, in none of the patients—there were more than half a dozen cases—was there any resulting infection. Nothing of a tuberculous nature was observable, either locally or generally; only at the points of injection small abscess-like formations were noted, the contents of which contained fewer or greater numbers of tubercle bacilli, which disappeared with the healing of the local abscesses.

In the autopsies of these patients, after they had died from their malignant disease, I found at the points of infection only small scars, the tissues of which were found, on microscopical examination, to be free from tubercle bacilli. Most critical macroscopical and microscopical examination of the adjacent lymph glands, as well as of the tissues of different organs, through which the malignant disease had become disseminated, failed to reveal tubercles or tubercle bacilli.

These inoculations of human subjects with highly virulent perle disease bacilli proved as negative as did my own and Prof. Koch's inoculations of cattle with human tubercle bacilli, although most of the human subjects under consideration survived inoculation from several months to over a year.

Considering Rokitsansky's experiments from a bacteriological standpoint, deductions drawn from the results might be objected to, on the ground that patients suffering from malignant disease offered an unsuitable soil for the development of the bacillus of tuberculosis. The teachings of Rokitsansky of the exclusion of tuberculosis by carcimona, and vice versa, have, however, long since been disproved. We know now that tuberculosis may co-exist with carcimona or with sarcoma, not only in the same organism, but even in the same organ, and that, in fact, one of these affections does not exclude the other.

From all the evidence, I believe myself justified in agreeing with Prof. Koch, and in saying that I do not apprehend any material danger for man from tuberculosis of cattle. This view I have also maintained heretofore, without bringing to my support the above related experiences

(1). In the interest of the study of tuberculosis, I would, however, regret, if, in view of the negative results of these infections, the knowledge obtained otherwise, as to the identity of the two diseases should now be ignored without further investigation of the subject. That the classical form of acute miliary tuberculosis can be produced in cattle by infection with bovine tubercle bacilli exactly as it occurs in man from human tubercle bacilli, the most ardent defender of the purely morphological definition of tubercle can not gainsay. That these results depend upon secondary conditions, such as the mode of infection and the number and virulence of the bacilli, is shown by the already mentioned experiments of Gaiser. Furthermore, that by certain external influences (iodoform vapor) the human tubercle bacillus can be so modified in its pathogenic power, as to produce the typical form of perle disease in the rabbit has been demonstrated in my institute by the experiments of Tangl and Troje (2).

It follows, therefore, that the bacilli from perle disease can cause typical miliary tuberculosis, and that human tubercle bacilli can produce the characteristic form of perle disease.

The histological identity of perle disease and tuberculosis, has first been shown by Schüppel in his well known and excellent work (3).

I have supplemented his proofs by showing that the characteristic caseation, observed in human tuberculosis, occurs similarly in the nodes of perle disease, in a typical form and with like regularity. The process, however, is frequently obscured by the rapidly succeeding calcareous changes in the caseous masses, terminal changes, which, in fact, have nothing to do with the actual disease, and which, moreover, are observed not infrequently in caseous masses in the human subject. These changes are, in all probability, due to the increased proportion of lime salts present in the bovine economy, as compared with that of the human subject.

If to the above we now add the morphological and cultural identity of the two forms of bacilli, and the identical reaction occurring in cattle from tuberculin obtained from human tubercle bacilli, we accumulate a sum total of evidence for the identity of the two diseases which can-

(1) Cf. mein Lehrbuch der pathologischen Mykologie 1890, Capitel Tuberkelbacillus.

(2) Dr. Troje at that time demonstrated his preparations in Berlin and received confirmation of the above interpretations.

(3) Cf. diese Wochenschr. 1880: Ueber das Verhältniss von Perlsucht und Tuberculose.

not be repudiated by reason of the previously mentioned negative results of the inoculation experiments; the less so since these may also be explained from a standpoint of identity.

Pathogenic action is well known to be one of the most variable characteristics of pathogenic bacteria. I have seen pure cultures of human tubercle bacilli which showed active growth upon glycerine-agar and upon potato-soil, but which, nevertheless, were powerless to infect the smallest rabbit, although in former generations they invariably caused the death of rabbits and guinea pigs from inoculation tuberculosis.

By means of higher temperatures we are, furthermore, able to affect the specific anthrax bacillus, so that it no longer grows in rabbits nor in guinea pigs, but only in mice.

Another powerful factor in producing such changes in pathogeny is the sojourn and growth of pathogenic bacteria in different animal hosts.

Thus we find that, for the rabbit the virulence of tubercle bacilli, derived from and spontaneously grown in cattle, can be decidedly increased by successively passing them through this animal. On the other hand the bacillus obtained from man or from cattle can be attenuated, by its prolonged sojourn in the chicken, to a degree in which it proves no longer pathogenic for the rabbit or the guinea pig (1).

The bacillus spontaneously grown in birds is but slightly infectious for rabbits; but by successively passing it through the same animal it so accommodates itself to the new soil that eventually it produces fatal tuberculosis in this animal. Is it therefore unreasonable to presume that, the bacillus which for countless generations has perpetuated itself, on the one hand, in the human, and on the other in the bovine organism, has thereby acquired certain peculiarities, which render impossible its propagation in a soil to which it has become a stranger? May we not further presume that although this bacillus, having possessed this power of adaptability, acquired it by propagation, and is liable to lose it again in the same way? This view which has been emphasized by Lister and Nocard at the London Congress, I prefer to accept, for the reasons already mentioned, in preference to the also tenable one, that in different species of animals we have to deal with different species of tubercle bacilli which are sharply and permanently differentiated from each other and are not transformable.

(1) Experiments conducted in my institute by Dr. Gramatschikoff (Centralbl. f. Allgem. Pathologie, Bd. II, 1891.)

The future must determine which of these two opinions is the correct one.

If through the knowledge already gained by experimentation, we shall, as I scarcely doubt, succeed in so influencing tubercle bacilli from a human source that they will cause perle disease or tuberculosis in cattle, the open question of the indentity of human and bovine tubercle bacilli will be settled.

Apart from my belief in the original indentity of these respective bacilli, in behalf of which I expect to derive additional support from further investigations, I have never considered the danger of the transmission of tuberculosis by animal food products a very great one. Nevertheless, I would not advise the relaxation of the measures at present directed to the prevention of this still possible mode of infection.

THE BRITISH CONGRESS OF TUBERCULOSIS.

HELD IN LONDON, JULY 22 TO 26, 1901.

The British Congress for the prevention of consumption, opened July 22, was a great success and was attended by 2000 members representing all civilized nations. Perhaps the most important communication, and indeed that which has excited the most universal comment, was the address of Professor Robert Koch which will be found below, together with abstracts of a number of other papers which we believe will prove of interest to our readers.

THE COMBATING OF TUBERCULOSIS IN THE LIGHT OF THE EXPERIENCE THAT HAS BEEN GAINED IN THE SUCCESSFUL COMBATING OF OTHER INFECTIOUS DISEASES.

BY PROFESSOR ROBERT KOCH, DIRECTOR OF THE INSTITUTE FOR INFECTIOUS DISEASES IN BERLIN.

The task with which this Congress will have to busy itself is one of the most difficult, but it is also one in which labor is most sure of its reward.

I need not point again to the innumerable victims tuberculosis annually claims in all countries, nor to the boundless misery it brings on the families it attacks. You all know that there is no disease which inflicts such deep wounds on mankind as this. All the greater, however, would be the general joy and satisfaction if the efforts that are being made to rid mankind of this enemy, which consumes its inmost marrow, were crowned with success.

There are many, indeed, who doubt the possibility of successfully combating this disease which has existed for thousands of years and has spread all over the world. This is by no means my opinion. This is a conflict into which we may enter with a surely founded prospect of success, and I will tell you the reasons on which I base this conviction.

Only a few decades ago the real nature of tuberculosis was unknown to us; it was regarded as a consequence, as the expression, so to speak, of social misery, and, as this supposed cause could not be gotten rid of by simple means, people relied on the probable gradual improvement of social conditions, and did nothing. All this is altered now. We know that social misery does indeed go far to foster tuberculosis, but the real cause of the disease is a parasite—that is, a visible and palpable enemy which we can pursue and annihilate, just as we can pursue and annihilate other parasitic enemies of mankind.

Strictly speaking, the fact that tuberculosis is a preventable disease should have become clear as soon as the tubercle bacillus was discovered, and the properties of this parasite and the manner of its transmission became known. I may add that I, for my part, was aware of the full significance of this discovery from the first, and so would everybody have been who had convinced himself of the causal relation between tuberculosis and the tubercle bacillus. But the strength of a small number of medical men was inadequate for the conflict with a disease so deeply rooted in our habits and customs. Such a conflict requires the cooperation of many, if possible of all medical men shoulder to shoulder with the state and the whole population; but now the moment when such cooperation is possible seems to have come. I suppose there is hardly any medical man now who denies the parasitic nature of tuberculosis; and among the non-medical public too the knowledge of the nature of the disease has been widely propagated.

Another favorable circumstance is that success has recently been achieved in the combating of several parasitic diseases, and that we have learned from these examples how the conflict with pestilences is to be carried on.

The most important lesson we have learned from the said experience is that it is a great blunder to treat pestilences uniformly. This was done in former times; no matter whether the pestilence in question was cholera, plague or leprosy; isolation, quarantine, useless disinfection were always resorted to. But now we know that every disease must be treated according to its own special individuality, and that the measures to be taken against it must be most accurately adapted to its special nature, to its etiology. We are entitled to hope for success in combating tuberculosis only if we keep this lesson constantly in view.

As so extremely much depends just on this point I shall take the liberty to illustrate it by several examples.

The pestilence which is at this moment in the foreground of interest, the bubonic plague, may be instructive to us in several respects.

People used to act upon the conviction that a plague patient was in the highest degree the centre of infection, and that the disease was transmitted only by plague patients and their belongings. Even the most recent international agreements are based on this conviction. Although, as compared with formerly, we now have the great advantage that we can, with the aid of the microscope and of experiments on animals, recognize every case of plague with absolute certainty, and although the prescribed inspection of ships, quarantine, the isolation of patients, the disinfection of infected dwellings and ships are carried out with the utmost care, the plague has, nevertheless, been transmitted everywhere, and has in not a few places assumed grave dimensions. Why this has happened we know very well, owing to the experience quite recently gained as to the manner in which the plague is transmitted. It has been discovered that only those plague patients that suffer from plague-pneumonia—a condition which is fortunately infrequent—are centres of infection, and that the real transmitters of the plague are the rats. There is no longer any doubt that, in by far the majority of the cases in which the plague has been transmitted by ocean traffic, the transmission took place by means of plague among ship rats. It has also been found that wherever the rats were intentionally or unintentionally exterminated the plague rapidly disappeared; whereas at other places where too little attention had been paid to the rat plague the pestilence continued. This connection between the human plague and the rat plague was totally unknown before, so that no blame attaches to those who devised the measures now in force against the plague, if the said measures have proved unavailing. It is high time, however, that this enlarged knowledge of the etiology of the plague be utilized in international as well as other traffic. As the human plague is so dependent on the rat plague it is intelligible that protective inoculation and the application of antitoxic serum have had so little effect. A certain number of human beings may have been saved from the disease by these means, but the general spread of the pestilence has not been hindered in the least.

With cholera the case is essentially different; it may, under certain circumstances, be transmitted directly from human beings to other human beings, but its main and most dangerous propagator is water, and therefore, in the combating of cholera, water is the first thing to be considered. In Germany, where this principle has been acted on, we have succeeded for four years in regularly exterminating the pesti-

lence (which was introduced again and again from the infected neighboring countries) without any obstruction of traffic.

Hydrophobia too is not void of instruction for us. Against this disease the so-called protective inoculation proper has proved eminently effective as a means of preventing the outbreak of the disease in persons already infected; but, of course, such a measure can do nothing to prevent infection itself. The only real way of combating this pestilence is by compulsory muzzling. In this matter also we have had the most satisfactory experience in Germany, but have at the same time seen that the total extermination of the pestilence can be achieved only by international measures, because hydrophobia, which can be very easily and rapidly suppressed, is always introduced again, year after year, from the neighboring countries.

Permit me to mention only one other disease, because it is etiologically very closely akin to tuberculosis, and we can learn not a little for the furtherance of our aims from its successful combating. I mean leprosy. It is caused by a parasite which greatly resembles the tubercle bacillus. Just like tuberculosis, it does not break out till long after infection, and its course is almost slower. It is transmitted only from person to person, but only when they come into close contact, as in small dwellings and bedrooms. In this disease, accordingly, immediate transmission plays the main part; transmission by animals, water or the like is out of the question. The combative measures, accordingly, must be directed against this close intercourse between the sick and the healthy. The only way to prevent this intercourse is to isolate the patients. This was most rigorously done in the Middle Ages by means of numerous leper-houses, and the consequence was that leprosy, which had spread to an alarming extent, was completely stamped out in central Europe. The same method has been adopted quite recently in Norway, where the segregation of lepers has been ordered by a special law. But it is extremely interesting to see how this law is carried out. It has been found that it is not at all necessary to execute it strictly, for the segregation of only the worst cases, and even of only a part of these, sufficed to produce a diminution of leprosy. Only so many infectious cases had to be sent to the leper-houses that the number of fresh cases kept regularly diminishing from year to year. Consequently the stamping out of the disease has lasted much longer than it would have lasted if every leper had been inexorably consigned to a leper house, as in the Middle Ages; but in this way too the same purpose is gained, slowly indeed, but without any harshness.

These examples may suffice to show what I am driving at, which is to point out that in combating pestilences we must strike at the root of

the evil, and must not squander force in subordinate, ineffective measures. Now the question is, whether what has hitherto been done and what is about to be done against tuberculosis really strikes at the root of tuberculosis, so that it must sooner or later die.

In order to answer this question it is necessary first and foremost to inquire how infection takes place in tuberculosis. Of course, I presuppose that we understand by tuberculosis only those morbid conditions which are caused by the tubercle bacillus.

In by far the majority of cases of tuberculosis the disease has its seat in the lungs, and has also begun there. From this fact it is justly concluded that the germs of the disease, *i. e.*, the tubercle bacilli, must have gotten into the lungs by inhalation. As to the question where the inhaled tubercle bacilli have come from, there is also a doubt. On the contrary, we know with certainty that they get into the air with the sputum of consumptive patients. This sputum, especially in advanced stages of the disease, almost always contains tubercle bacilli, sometimes in incredible quantities. By coughing, and even by speaking, it is flung into the air in little drops, *i. e.*, in a moist condition, and can at once infect persons who happen to be near the coughers. But then it may also be pulverized when dried, in the linen or on the floor for instance, and get into the air in the form of dust.

In this manner a complete circle, a so-called *circulus vitiosus*, has been formed for the process of infection, from the diseased lung which produces phlegm and pus containing tubercle bacilli, to the formation of moist and dry particles (which, by virtue of their smallness, can keep floating a good while in the air), and finally to new infection, if particles penetrate with the air into a healthy lung and originate the disease anew. But the tubercle bacilli may get to other organs of the body in the same way, and thus originate other forms of tuberculosis. This, however, is a considerably rarer case. The sputum of consumptive people, then, is to be regarded as the main source of the infection of tuberculosis. On this point, I suppose, all are agreed. The question now arises whether there are not other sources too, important enough to demand consideration in the combating of tuberculosis.

Great importance used to be attached to the hereditary transmission of tuberculosis. Now, however, it has been demonstrated by thorough investigation that, though hereditary tuberculosis is not absolutely non-existent, it is nevertheless extremely rare, and we are at liberty, in considering our practical measures, to leave this form of origination entirely out of account.

But another possibility of tuberculous infection exists, as is generally assumed, in the transmission of the germs of the disease from tu-

berculous animals to man. This manner of infection is generally regarded nowadays as proved, and as so frequent that it is even looked upon by not a few as the most important, and the most rigorous measures are demanded against it. In this Congress also, the discussion of the danger with which the tuberculosis of animals threatens man will play an important part. Now, as my investigations have led me to form an opinion deviating from that which is generally accepted, I beg your permission, in consideration of the great importance of this question, to discuss it a little more thoroughly.

Genuine tuberculosis has hitherto been observed in almost all domestic animals, and most frequently in poultry and cattle. The tuberculosis of poultry, however, differs so much from human tuberculosis that we may leave it out of account as a possible source of infection for man. So, strictly speaking, the only kind of animal tuberculosis remaining to be considered is the tuberculosis of cattle, which, if really transferable to man, would indeed have frequent opportunities of infecting human beings through the drinking of the milk and the eating of the flesh of diseased animals.

Even in my first circumstantial publication on the etiology of tuberculosis I expressed myself regarding the identity of human tuberculosis and bovine tuberculosis with reserve. Proved facts which would have enabled me sharply to distinguish these two forms of the disease were not then at my disposal, but sure proofs of their absolute identity were equally undiscoverable, and I therefore had to leave this question undecided. In order to settle it I have repeatedly resumed the investigation relating to it, but so long as I experimented on small animals such as rabbits and guinea pigs, I failed to arrive at any satisfactory result, though indications which rendered the difference of the two forms of tuberculosis probable were not wanting. Not till the complaisance of the Ministry of Agriculture enabled me to experiment on cattle, the only animals really suitable for these investigations, did I arrive at absolutely conclusive results. Of the experiments which I have carried out during the last two years along with Professor Schütz, of the Veterinary College in Berlin, I will tell you briefly some of the most important.

A number of young cattle which had stood the tuberculin test, and might therefore be regarded as free from tuberculosis, were infected in various ways with pure cultures of tubercle bacilli taken from cases of human tuberculosis; some of them got the tuberculous sputum of consumptive patients direct. In some cases the tubercle bacilli or the sputum were injected under the skin, in others into the peritoneal cavity, in others into the jugular vein. Six animals were fed with tuberculous

sputum almost daily for seven or eight months; four repeatedly inhaled great quantities of bacilli, which were distributed in water, and scattered with it in the form of spray. None of these cattle (there were nineteen of them) showed any symptoms of disease, and they gained considerably in weight. From six to eight months after the beginning of the experiments they were killed. In their internal organs not a trace of tuberculosis was found. Only at the places where the injections had been made small suppurative foci had been formed in which a few tubercle bacilli could be found. This is exactly what one finds when one injects dead tubercle bacilli under the skin of animals liable to contagion. So the animals we experimented on were affected by the living bacilli of human tuberculosis exactly as they would have been by dead ones; they were absolutely insusceptible to them.

The result was utterly different, however, when the same experiment was made on cattle free from tuberculosis with tubercle bacilli that came from the lungs of an animal suffering from bovine tuberculosis. After an incubation period of about a week the severest tuberculous disorders of the internal organs broke out in all the infected animals. It was all one whether the infecting matter had been injected only under the skin, into the peritoneal cavity or into the vascular system. High fever set in, and the animals became weak and lean; some of them died after from a month and a half to two months; others were killed in a miserably sick condition after three months. After death extensive tuberculous infiltrations were found at the places where the injections had been made, and in the neighboring lymphatic glands, and also far advanced alterations of the internal organs, especially the lungs and the spleen. In the cases in which the injection had been made into the peritoneal cavity the tuberculous growths which are so characteristic of bovine tuberculosis were found on the omentum and peritoneum. In short, the cattle proved just as susceptible to infection by the bacillus of bovine tuberculosis as they had proved insusceptible to infection by the bacillus of human tuberculosis. I wish only to add that preparations of the organs of the cattle which were artificially infected with bovine tuberculosis in these experiments are exhibited in the Museum of Pathology and Bacteriology.

An almost equally striking distinction between human and bovine tuberculosis was brought to light by a feeding experiment with swine. Six young swine were fed daily for three months with the tuberculous sputum of consumptive patients. Six other swine received bacilli of bovine tuberculosis with their food daily for the same period. The animals that were fed with sputum remained healthy and grew lustily, whereas those that were fed with the bacilli of bovine tuberculosis soon

became sickly, were stunted in their growth, and half of them died. After three months and a half the surviving swine were all killed and examined. Among the animals that had been fed with sputum no trace of tuberculosis was found, except here and there little nodules in the lymphatic glands of the neck, and in one case a few grey nodules in the lungs. The animals, on the other hand, which had eaten bacilli of bovine tuberculosis had, without exception, (just as in the cattle experiment), severe tuberculous disease, especially tuberculous infiltration of the greatly enlarged lymphatic glands of the neck and of the mesentery and also extensive tuberculosis of the lungs and the spleen.

The difference between human and bovine tuberculosis appeared not less strikingly in a similar experiment with asses, sheep and goats, into whose vascular systems the two kinds of tubercle bacilli were respectively injected.

Our experiments, I must add, are not the only ones that have led to this result. If one studies the older literature of the subject, and collates the reports of the numerous experiments that were made in former times by Chaveau, Günther and Harms, Bollinger and others, who fed calves, swine and goats with tuberculous material, one finds that the animals that were fed with the milk and pieces of the lungs of tuberculous cattle always fell ill of tuberculosis, whereas those that received human material with the food did not. Comparative investigations regarding human and bovine tuberculosis have been made very recently in North America by Smith, Dinwiddie and Frothingham, and their result agreed with ours. The ambiguous and absolutely conclusive result of our experiments is due to the fact that we chose methods of infection which exclude all sources of error, and carefully avoided everything connected with the stalling, feeding, and tending of the animals that might have a disturbing effect on the experiments.

Considering all these facts, I feel justified in maintaining that human tuberculosis differs from bovine, and cannot be transmitted to cattle. It seems to me very desirable, however, that these experiments should be repeated elsewhere, in order that all doubts as to the correctness of my assertion may be removed.

I wish only to add that, owing to the great importance of this matter, the German Government has appointed a commission to make further inquiries on the subject.

But now, how is it with the susceptibility of man to bovine tuberculosis? This question is far more important to us than that of the susceptibility of cattle to human tuberculosis, highly important as that is too. It is impossible to give this question a direct answer, because, of course, the experimental investigation of it with human beings is out of

the question. Indirectly, however, we can try to approach it. It is well known that the milk and butter consumed in great cities very often contain large quantities of the bacilli of bovine tuberculosis in a living condition, as the numerous infection experiments with such dairy products on animals have proved. Most of the inhabitants of such cities daily consume such living and perfectly virulent bacilli of bovine tuberculosis, and unintentionally carry out the experiment which we are not at liberty to make. If the bacilli of bovine tuberculosis were able to infect human beings, many cases of tuberculosis caused by the consumption of aliments containing tubercle bacilli could not but occur among the inhabitants of great cities, especially the children. Most medical men believe that this is actually the case.

In reality, however, it is not so. That a case of tuberculosis has been caused by aliments can be assumed with certainty only when the intestine suffers first—*i. e.*, when a so-called primary tuberculosis of the intestine is found. But such cases are extremely rare. Among many cases of tuberculosis examined after death, I myself remember having seen primary tuberculosis of the intestine only twice. Among the great *post-mortem* material of the Charité Hospital in Berlin ten cases of primary tuberculosis of the intestine occurred in five years. Among 933 cases of tuberculosis in children at the Emperor and Empress Frederick's Hospital for Children, Baginsky never found tuberculosis of the intestine without simultaneous disease of the lungs and the bronchial glands. Among 3,104 *post mortems* of tuberculous children, Biedert observed only sixteen cases of primary tuberculosis of the intestine. I could cite from the literature of the subject many more statistics of the same kind, all indubitably showing that primary tuberculosis of the intestine, especially among children, is a comparatively rare disease, and of these few cases that have been enumerated it is by no means certain that they were due to infection by bovine tuberculosis. It is just as likely that they were caused by the widely propagated bacilli of human tuberculosis, which may have gotten into the digestive canal in some way or other—for instance, by swallowing saliva of the mouth. Hitherto nobody could decide with certainty in such a case whether the tuberculosis of the intestine was of human or of animal origin. Now we can make the differential diagnosis. All that is necessary is to cultivate in pure culture the tubercle bacilli found in the tuberculous material, and to ascertain whether they belong to bovine tuberculosis by inoculating cattle with them. For this purpose I recommend subcutaneous injection, which yields quite specially characteristic and convincing results. For half a year past I have occupied myself with such investigations, but, owing to the rarity of the disease in question, the number of cases I have

been able to investigate is small. What has hitherto resulted from this investigation does not speak for the assumption that bovine tuberculosis occurs in man.

Though the important question whether man is susceptible to bovine tuberculosis at all is not yet absolutely decided, and will not admit of absolute decision to-day or to-morrow, one is nevertheless already at liberty to say that, if such a susceptibility really exists, the infection of human beings is but a very rare occurrence. I should estimate the extent of infection by the milk and flesh of tuberculous cattle, and the butter made of their milk, as hardly greater than that of hereditary transmission, and I therefore do not deem it advisable to take any measures against it.

So the only main source of the infection of tuberculosis is the sputum of consumptive patients, and the measures for the combating of tuberculosis must aim at the prevention of the dangers arising from its diffusion. Well, what is to be done in this direction? Several ways are open. One's first thought might be to consign all persons suffering from tuberculosis of the lungs, whose sputum contains tubercle bacilli, to suitable establishments. This, however, is not only absolutely impracticable, but also necessary; for a consumptive who coughs out tubercle bacilli is not necessarily a source of infection on that account, so long as he takes care that his sputum is properly removed and rendered innocuous. This is certainly true of very many patients, especially in the first stages, and also of those who belong to the well-to-do classes, and are able to procure the necessary nursing. But how is it with people of very small means? Every medical man who has often entered the dwellings of the poor, and I can speak on this point from my own experience, knows how sad is the lot of consumptives and their families there. The whole family has to live in one or two small, ill-ventilated rooms. The patient is left without the nursing he needs, because the able-bodied members of the family must go to their work. How can the necessary cleanliness be secured under such circumstances? How is such a helpless patient to remove his sputum, so that it may do no harm? But let us go a step farther and picture the condition of a poor consumptive patient's dwelling at night. The whole family sleeps crowded together in one small room. However cautious he may be the sufferer scatters the morbid matter secreted by his diseased lungs every time he coughs, and his relatives close beside him must inhale this poison. Thus whole families are infected. They die out and awaken in the minds of those who do not know the infectiousness of tuberculosis the opinion that it is hereditary, whereas its transission in the cases in question was due solely to the simplest processes of infection, which do

not strike people so much, because the consequences do not appear at once, but generally only after the lapse of years.

Often, under such circumstances, the infection is not restricted to a single family, but spreads in densely inhabited tenement-houses to the neighbors, and then, as the admirable investigations of Biggs have shown in the case of the densely peopled parts of New York, regular nests of foci of disease are formed. But, if one investigates these matters more thoroughly, one finds that it is not poverty *per se* that favors tuberculosis, but the bad domestic conditions under which the poor everywhere, but especially in great cities, have to live. For, as the German statistics show, tuberculosis is less frequent, even among the poor, when the population is not densely packed together, and may attain very great dimensions among a well-to-do population when the domestic conditions, especially as regards the bedrooms, are bad, as is the case, for instance, among the inhabitants of the North Sea coast. So it is the overcrowded dwellings of the poor that we have to regard as the real breeding-places of tuberculosis; it is out of them that the disease always crops up anew, and it is to the abolition of these conditions that we must first and foremost direct our attention if we wish to attack the evil at its root and to wage war against it with effective weapons.

This being so, it is very gratifying to see how efforts are being made in almost all countries to improve the domestic conditions of the poor. I am also convinced that these efforts, which must be promoted in every way, will lead to a considerable diminution of tuberculosis. But a long time must elapse ere essential changes can be effected in this direction, and much may be done meanwhile in order to reach the goal much more rapidly.

If we are not able at present to get rid of the danger which small and overcrowded dwellings involve, all we can do is to remove the patients from them, and, in their own interest, and that of the people about them, to lodge them better; and this can be done only in suitable hospitals. But the thought of attaining this end by compulsion of any kind is very far from me; what I want is that the consumptives may be enabled to obtain the nursing they need better than they can obtain it now. At present a consumptive in an advanced stage of the disease is regarded as incurable and as an unsuitable inmate for a hospital. The consequence is that he is reluctantly admitted and is dismissed as soon as possible. The patient too, when the treatment seems to him to produce no improvement, and the expenses, owing to the long duration of his illness weigh heavily upon him, is himself animated by the wish to leave the hospital soon. That would be altogether altered if we had special hospitals for consumptives, and if the patients were

taken care of there for nothing, or at least at a very moderate rate. To such hospitals they would willingly go; they could be better treated and cared for there than is now the case. I know very well that the execution of the project will have great difficulties to contend with, owing to the considerable outlay it entails. But very much would be gained if, at least in the existing hospitals, which have to admit a great number of consumptives at any rate, special wards were established for them, in which pecuniary facilities would be offered them. If only a considerable fraction of the whole number of consumptives were suitably lodged in this way, a diminution of infection and consequently of the sum total of tuberculosis could not fail to be the result. Permit me to remind you in this connection of what I said about leprosy. In the combating of that disease also, great progress has already been made by lodging only a fair number of the patients in hospitals. The only country that possesses a considerable number of special hospitals for tuberculous patients is England, and there can be no doubt that the diminution of tuberculosis in England, which is much greater than in any other country, is greatly due to this circumstance. I should point to the founding of special hospitals for consumptives and the better utilization of the already existing hospitals for the lodging of consumptives as the most important measure in the combating of tuberculosis, and its execution opens a wide field of activity to the state, to municipalities, and to private benevolence. There are many people who possess great wealth, and would willingly give of their superfluity for the benefit of their poor and heavily afflicted fellow creatures, but do not know how to do this in a judicious manner. Here is an opportunity for them to render a real and lasting service by founding consumption hospitals or by purchasing the right to have a certain number of consumptive patients maintained in special wards of other hospitals free of expense.

As, however, unfortunately, the aid of the state, the municipalities, and rich benefactors will probably not be forthcoming for a long time yet, we must, for the present, resort to other measures that may pave the way for the main measure just referred to, and serve as a supplement and temporary substitute for it.

Among such measures I regard obligatory notification as specially valuable. In the combating of all infectious diseases it has proved indispensable as a means of obtaining certain knowledge as to their state, especially their dissemination, their increase and decrease. In the conflict with tuberculosis also we cannot dispense with obligatory notification; we need it not only in order to inform ourselves as to the dissemination of this disease, but mainly in order to learn where help and instruc-

tion can be given, and especially where the disinfection which is so urgently necessary when consumptives die or change their residences has to be effected. Fortunately it is not at all necessary to notify all cases of tuberculosis, nor even all cases of consumption, but only those that, owing to the domestic conditions, are sources of danger to the people about them. Such limited notification has already been introduced in various places, in Norway, for instance, by a special law, in Saxony by a ministerial decree, in New York and in several American towns, which have followed its example. In New York, where notification was optional at first and was afterwards made obligatory, it has proved eminently useful. It has been proved that the evils which it used to be feared the introduction of notification for tuberculosis would bring about need not occur; and it is devoutly to be wished that the examples I have named may very soon excite emulation everywhere.

There is another measure, closely connected with notification, viz., disinfection, which, as already mentioned, must be effected when consumptives die or change their residence, in order that those who next occupy the infected dwelling may be protected against infection. Moreover, not only the dwellings but also the infected beds and clothes of consumptives ought to be disinfected.

A further measure, already recognized on all hands as effective, is the instructing of all classes of the people as to the infectiousness of tuberculosis, and as to the best way of protecting oneself. The fact that tuberculosis has considerably diminished in almost all civilized states of late, is attributed solely to the circumstance that knowledge of the contagious character of tuberculosis has been more and more widely disseminated, and that caution in intercourse with consumptives has increased more and more in consequence. If better knowledge of the nature of tuberculosis has alone sufficed to prevent a large number of cases, this must serve us as a significant admonition to make the greatest possible use of this means, and to do more and more to bring it about that everybody may know the dangers that threaten him in intercourse with consumptives. It is only to be desired that the instructions may be made shorter and more precise than they generally are, and that special emphasis be laid on the avoidance of the worst danger of infection, which is the use of bedrooms and small ill-ventilated workrooms simultaneously with consumptives. Of course the instructions must include directions as to what consumptives have to do when they cough and how they are to treat their sputum.

Another measure which has come into the foreground of late, and which at this moment plays to a certain extent a paramount part in all

efforts for the combating of tuberculosis works in quite another direction. I mean the founding of sanatoria for consumptives.

That tuberculosis is curable in its early stages must be regarded as an undisputed fact. The idea of curing as many tuberculous patients as possible in order to reduce the number of those that reach the infectious stage of consumption, and thus to reduce the number of fresh cases, was therefore a very natural one. The only question is whether the number of persons cured in this way will be great enough to exercise an appreciable influence on the retrogression of tuberculosis. I will try to answer this question in the light of the figures at my disposal.

According to the business report of the German Central Committee for the Establishment of Sanatoria for the Cure of Consumptives, about 5,500 beds will be at the disposal of these institutions by the end of 1901, and then, if we assume that the average stay of each patient will be three months, it will be possible to treat at least 20,000 patients every year. From the reports hitherto issued of the results that have been achieved in these establishments, we learn further that about 20 per cent. of the patients that have tubercle bacilli in their sputum lose them by the treatment there. This is the only sure test of success, especially as regards prophylaxis. If we make this the basis of our estimates, we find that 4,000 consumptives will leave these establishments annually as cured. But, according to the statistics ascertained by the German Imperial Office of Health, there are 226,000 persons in Germany over fifteen years of age, who are so far gone in consumption that hospital treatment is necessary for them. Compared with this great number of consumptives the success of the establishments in question seems so small that a material influence on the retrogression of tuberculosis in general is not yet to be expected of them. But pray do not imagine that I wish, by this calculation of mine to oppose the movement for the establishment of such sanatoria in any way. I wish only to warn against the over-estimating of their importance which has recently been observable in various quarters, based apparently on the opinion that the war against tuberculosis can be waged by means of sanatoria alone, and that other measures are of subordinate value. In reality the contrary is the case. What is to be achieved by the general prophylaxis resulting from recognition of the danger of infection and the consequent greater caution in intercourse with consumptives is shown by a calculation of Cornet's regarding the decrease of mortality from tuberculosis in Prussia in the years 1889 to 1897. Before 1889 the average was 31.4 per 10,000 whereas in the period named it sank to 21.8, which means that, in that short space of time, the number of deaths from tuberculosis was 184,000 less than was

to be expected from the average of the preceding years. In New York, under the influence of the general sanitary measures directed in a simply exemplary manner by Biggs, the mortality from tuberculosis has diminished by more than 35 per cent. since 1886. And it must be remembered that both in Prussia and in New York the progress indicated by these figures is due to the first beginnings of these measures. Considerably greater success is to be expected of their further development. Biggs hopes to have gotten so far in five years that in the city of New York alone the annual number of deaths from tuberculosis will be 3,000 less than formerly. I take this opportunity of most urgently recommending Dr. Biggs' organization to the study and imitation of all municipal sanitary authorities.

Now, I do indeed believe that it will be possible to render the sanatoria considerably more efficient. If strict care be taken that only patients be admitted for whom the treatment of those establishments is well adapted, and if the duration of the treatment be prolonged, it will certainly be possible to cure fifty per cent. and perhaps still more. But even then, and even if the number of the sanatoria be greatly increased, the total effect will always remain but moderate. The sanatoria will never render the other measures I have mentioned superfluous. If their number becomes great, however, and if they perform their functions properly, they may materially aid the strictly sanitary measures in the conflict with tuberculosis.

If now, in conclusion, we glance back once more to what has been done hitherto for the combating of tuberculosis, and forward to what has still to be done, we are at liberty to declare with a certain satisfaction that very promising beginnings have already been made. Among these I reckon the consumption hospitals of England, the legal regulations regarding notification in Norway and Saxony, the organization created by Biggs in New York, the sanatoria and the instruction of the people. All that is necessary is to go on developing these beginnings, to test, and if possible to increase their influence on the diminution of tuberculosis, and wherever nothing has yet been done, to do likewise.

If we are continually guided in this enterprise by the spirit of genuine preventive medical science, if we utilize the experience gained in conflict with other pestilences, and aim, with clear recognition of the purpose and resolute avoidance of wrong roads, at striking the evil at its root, then the battle against tuberculosis, which has been so energetically begun, cannot fail to have a victorious issue.

THE RELATION OF ALCOHOLISM TO TUBERCULOSIS.

(BY DR. T. N. KELYNACK, MANCHESTER.)

Alcoholism and tuberculosis stand foremost amongst the causes hampering human progress and limiting man's happiness. Through them the evolution of the race has been impeded, and unfortunately, in spite of numerous restraining and restricting agencies, their baneful influence is still accountable for a high degree of mortality and an immense amount of sickness and suffering.

The stay of such calamitous agencies has long afforded problems which have appealed to all sorts and conditions of men, and their solution even now is to a great extent shrouded in mystery and surrounded by difficulty.

With two such morbid influences barring human advance, it was but natural that eager minds, studying the one, should have been compelled to recognize the presence and action of the other. Hence the question as to the relationship of alcoholism to tuberculosis is one of old standing. But since the answers have been hitherto by no means uniform, it is particularly desirable that some approximation to the truth should be arrived at, and if possible generally accepted.

The position has been well expressed by Dr. Payne, who says:—(1)

“With regard to the influence of alcohol on the production of tubercle, the utmost divergence and indeed contradictory opposition of opinion prevails. Huss found phthisis to be rare in drunkards, and that has been the general conclusion drawn from post-mortem observations. It has even been thought that drinking freely checks the progress of phthisis, but of this I can find little evidence. On the other hand, the more general impression is that alcoholism is a frequent cause of consumption.” Dr. Payne goes on to say, “On this disputed point we must appeal to the methodized experience of those who have special opportunities of observation.”

The subject, however, is one of peculiar and unavoidable difficulties; and not the least arises from prejudices which, however repugnant to scientific research, have only too frequently warped the minds of those who attempted an investigation of the matter.

Effort to elucidate the question by appeal to what has been termed clinical statistics is necessarily permeated with fallacy.

Purely experimental inquiry, however suggestive in the presence of modifying influences, concerning which we have but little knowledge and but limited control, can afford but unreliable results.

¹ (1) Payne: Transactions of the Pathological Society of London, 1889. Vol. XL., p. 332.

Mortality returns, though rendering material for interesting, and it may be useful analysis, afford data too gross for anything but rough generalizations.

A study by pathological examination of a large number of cases would seem to afford the most hopeful method of research, and when combined with a discriminating clinical investigation, is likely to accomplish as near an approach to the truth as we are likely to obtain under present circumstances. But before indicating the manner and results of such a method of inquiry it will be well to refer briefly to opinions and conclusions of certain authorities, which, as the outcome of exceptional experience or special inquiry may be deemed worthy of consideration, and it will be desirable that special reference be accorded to those expressions which are based on a knowledge of alcoholism and tuberculosis as met with more particularly in this country.

Three views are possible:—

- I. That alcoholism is antagonistic to tuberculosis.
- II. That alcoholism bears no special relationship to tuberculosis.
- III. That alcoholism definitely predisposes to tuberculosis.

Let us briefly consider them.

I.

Before the true nature of tuberculosis became apparent, the opinion was somewhat widely held that habits of alcoholic excess were antagonistic to tuberculosis and even preventive. The impression still exists among many laymen and is apparently in part due to opinions expressed by many of the earlier writers on pulmonary tuberculosis. Indeed, in some medical quarters such a view is still held.

This view was clearly expressed by Dr. Richard Payne Cotton (1) many years since in his Fothergillian Essay: "It is worthy of remark that the habitual drunkard—he who is always in his cups—is not very often the subject of phthisis; such at least, is the result of my own observations."

The idea that alcoholism was antagonistic to tuberculosis, may, perhaps, in part account for the advocacy of its persistent and even excessive use in phthisis.

Bennett, (2) writing some thirty years since, says: "Of late years, in America, alcohol, especially whiskey, has been much lauded as a remedy in consumption;" but adds "I have seen a certain number of cases in which it had been long taken, but I cannot say with benefit.

(1) "On Consumption; its Nature, Symptoms and Treatment." 1858.

(2) "On the Treatment of Pulmonary Consumption." Second Edition, 1871.

The daily ingestion of large quantities of nerve-stimulating, carbon-producing spirit certainly does not come under my ideas of hygienic treatment."

Flint used alcohol freely, that is from six ounces to a pint of spirits daily, and appears to have considered it beneficial, "but not in the sense of exerting a special influence upon the disease." (1)

Charteris, writing in 1877 concerning the administration of whiskey to phthysical patients, says, "In private practice I order it to be taken *ad libitum*."

Dr. Hermann Weber, (2) in 1885, was convinced of the great usefulness of alcohol in the treatment of phthisis.

Dr. Thomas Harris (3) tried the effects of whiskey containing 53 per cent. of alcohol, during a period of nine months. Twenty-six cases were so treated, the doses commencing with two drachms of pure whiskey gradually increased to one-and-a-half ounce of whiskey every four hours, day and night. Dr. Ransome, who saw many of the cases, expressed the opinion that, "at certain times of the day the dose of alcohol was unnecessarily large; for some of the patients at times were distinctly flushed, and slept heavily even in the daytime."

Dr. Harris states: "No case left the hospital in a worse state than that in which he entered it. As regards the physical signs, very little difference could be detected between those at the date of admission and the date of the discharge of the individual." Manifestly in no instance did "cure" occur.

It is interesting to note that Bell, of New York, as far back as 1859, opposed the current view, for he then stated: "The opinion so largely prevailing as to the effects of the use of alcoholic liquors, viz., that they have a marked influence in preventing the deposition of tubercle, is destitute of any solid foundation.

"On the contrary, their use appears rather to predispose to tuberculous deposition.

"When tubercle already exists alcohol has no obvious effect in modifying the usual course it takes.

"Neither does it mitigate in any considerable degree the morbid effects of tubercle upon the system in any stage of the disease." (4)

The abolition of alcohol from many modern sanatoria seems to indicate that, as Dr. Ransome well expresses it, "Owing to the terrible

(1) "Phthisis," by Austin Flint. 1875.

(2) Weber, Hermann. *Lancet*, 1885, 1., p. 606.

(3) "The Treatment of Phthisis," by Dr. Arthur Ransome. 1896, p. 95.

(4) *Medical Times and Gazette*, 1859, 1., p. 587.

consequences of excess, and to the proclivity of mankind to its excessive employment, it (alcohol) can only be recommended in selected cases with many cautions." (1)

II.

Many hold that alcoholism bears no special relationship to tuberculosis and only exerts an indirect influence in so far as it leads to a lowering of general vitality and places the individual under conditions particularly favorable to the infection of tubercle. And certainly the circumstances attending the life of the chronic alcoholic are generally such as to speedily expose him to the risk of tuberculosis.

His habits lead in great measure to an indoor existence, the maintenance of insanitary environment, insufficiency of suitable food, oftentimes to the influence of depressing emotions; and not infrequently his indulgence necessitates his following an occupation, under conditions which are peculiarly inimical to health. Thus, while the influence of overcrowding, neglect, uncleanness, malnutrition and nerve influences cannot be overlooked, very considerable difficulty attends any attempt to estimate the effect of alcohol *per se* in rendering the tissues peculiarly vulnerable to the tubercle bacillus.

III.

The view that alcoholism definitely predisposes to tuberculosis has of recent years received much support.

Indeed, the tendency of modern opinion is to recognize alcohol as an agent which renders the tissues specially prone to tuberculous infection.

This is well exemplified by such recent expressions as the following:—

Dr. Hector Mackenzie, in a recent article on tuberculosis, declares (2) that: "Alcoholism must be regarded as a powerful predisposing cause of tuberculosis.

"It is almost invariable to find tubercles present in the lungs in patients dying in the course of alcoholic paralysis.

"Tubercle of the peritoneum or pleura frequently complicates cirrhosis of the liver.

"Alcohol in excess undermines the strongest constitution, and renders the body less resistant to diseases of all kinds. This is especially true when the individual leads a sedentary town life. Considerable

(1) "The Treatment of Phthisis." By Arthur Ransome, M. D., London, 1896. p. 94.

(2) Text Book of Medicine. Edited by Dr. G. A. Gibson. 1901. Vol. I., pp. 352-371.

amounts of alcohol may be taken without obvious deterioration of health by persons who lead an out-of-door life and eat heartily.

"Alcoholic subjects appear to be specially liable to acute miliary tuberculosis."

One of the most recent and definite pronouncements is that of Professor Thomas Oliver, (1) who says:—

"Nor is there any truth in the opinion held by the laity, that the use of alcohol protects the individual against tuberculous disease. I do not refer to such a restrictive employment of alcohol as a glass of beer or stout, or a little wine at dinner time. That may be helpful to the individual. It is to the mistaken opinion that where there is a family predisposition to the disease it is necessary to be somewhat more indulgent. In my own experience with young men with a hereditary tendency to phthisis, alcohol has, by the late hours which it encourages, and the careless and irregular habits that it fosters, frequently precipitated the individual into active tuberculous disease which abstinence and more careful living would have assuredly prevented. It indirectly favours the development of tuberculous disease. Pulmonary tuberculosis was found by Dickerson to be more frequent in drinkers than in ordinary people, in the proportion of three to one. Rolleston, quoting H. Mackenzie, states that in sixty-seven cases of pulmonary tuberculosis occurring in drinkers a family history of tuberculosis was found only in ten, whereas it is found in about 30 per cent. of the ordinary cases. The frequent association of pulmonary tuberculosis with alcoholic peripheral neuritis, and its presence, too, in nearly one-third of the cases of cirrhosis of the liver, are circumstances which show that under the debilitating influence of alcohol resistance is reduced, ordinary pulmonary catarrhs are not so quickly thrown off, and thus the bacillus of tuberculosis gains an easier entrance."

Some have held that there is a tendency for phthisis in alcoholics to assume the fibroid form, but this is not in accordance with the best modern experience.

Drs. Poore and Allchin, in a recent article, (2) speak of the association of tuberculous phthisis with alcoholic cirrhosis of the liver as "well established; the course of the disease being usually one of rapid

(1) Text Book of Medicine. Edited by Dr. G. A. Gibson. 1901. Vol. I., p. 603.

(2) Poore, G. V., and Allchin, W. H. "Diseases Determined by Poisons." A Manual of Medicine. Edited by W. H. Allchin. London, 1900. Vol. II., p. 52.

caseation and excavation with broncho-pneumonia and rarely tending towards fibrosis."

But the close association of tuberculosis and alcoholism has now been widely recognized, not only by the British physicians, but also particularly by American and French observers. Various suggestions have been made in explaining the liability of alcoholics to tuberculosis. There can be no doubt that the non-hygienic surrounding and nutritional impairment and lowered vitality of the drunkard greatly predispose him to tuberculous invasion. But it is contended by some that, even besides these factors, there are special influences arising from the action of the alcohol and its associates. Professor Sims Woodhead has recently shown that alcohol has a marked influence in altering or determining alteration of the cells of animals subjected to the action of certain pathogenic organisms. Professor Abbott, of Pennsylvania, and also Dr. Delearde, working in the Institut Pasteur at Lille, have recently shown that alcoholized animals are more readily infected by many organisms than non-alcoholized animals, and other investigators have also shown that alcohol produces a marked negative chemiotaxis. It has also been found that animals brought into a state of chronic alcoholism are much less readily rendered experimentally immune to microbial infection. Attempts have also been made to show that alcohol, through its influence on nervous structures, renders the tissues, and especially the lungs, prone to invasion by tubercle. (1)

In order to compare some of our Manchester experience with the views and opinions above indicated, I have endeavored to analyze and express the results of observation of hospital cases for a number of years. A reference to pathological data probably affords the most reliable basis for the formation of sound views as to the relationship of alcoholism and tuberculosis.

ALCOHOLIC NEURITIS AND PHTHISIS.

Some time since I analyzed a number of fatal cases of peripheral neuritis in chronic alcoholics. Eight cases were subjected to pathological examination during a period of three years; they formed 1.6 per cent. of all the medical cases examined during that period. Pulmonary tuberculosis was met with in seven. This gives a percentage of over eighty-seven. All the cases were females. In only one subject were there distinct tuberculous lesions elsewhere than in the lungs, and then the intestines were also infected. In one subject there was an old tuberculous focus at the apex of the lung, but it seems probable that the active phthisis

(1) See "Pulmonary Consumption, Pneumonia. and Allied Diseases of the Lungs" By Thomas J. Mays. New York, 1891. p. 61.

was rather due to a fresh infection than from this latent patch. In five cases both lungs were more or less involved; in two the left was the only one showing any distinct tuberculous process; in three of the cases the course seemed to have been rapid; in four it seemed to have lasted for several months. One subject, it was stated, had "spat blood" six months before her death; in one case one lung only was studded with small tubercles, the infection evidently having been recent; in two there was more or less extensive caseation; four presented evidences of softening and cavitation; and in two of these there was some fibrosis. (1) Since collecting the above I have gone over my more recent pathological notes. Two further cases of alcoholic multiple neuritis have come to autopsy. In one, a male, aged thirty-five, the subject also of hepatic cirrhosis, both lungs were studded with recent tubercles. There was no softening, but caseous foci at the apices were apparent, of older formation than the tubercles elsewhere. In the other case, a female, aged 32, in whom there was also a fatty and cirrhotic liver, the lungs, although congested, oedematous, and presenting patches of broncho-pneumonia, showed no distinct evidences of tubercle. Thus out of ten fatal cases of alcoholic neuritis—nine females and one male—8, or 80 per cent., were the subjects of pulmonary tuberculosis.

In connection with the recent remarkable outbreak of arsenical neuritis in Manchester and district, which occurred principally in alcoholics among the poorer classes, it is interesting to note that in a considerable number of the fatal cases active pulmonary tuberculosis was present, and in some undoubtedly much hastened the end.

Tuberculosis is also of frequent occurrence in the subjects of alcoholic cirrhosis of the liver. In many cases it is manifestly of the nature of a terminal infection.

In order to throw light on this matter, the records of 3,053 medical cases examined in the Pathological Department of the Manchester Royal Infirmary have been analyzed. I have collected 121 examples of common cirrhosis of the liver. All doubtful and complicated cases were omitted. Cases associated with cardiac or such chronic affections as seemed to have led to secondary changes in the liver were excluded. All examples of "biliary" cirrhosis and those in any way connected with syphilis have been passed over. After omitting several doubtful cases, in twenty-eight, tuberculosis—either active, latent, or obsolete—was present. Thus over 23 per cent. presented evidences of tuberculosis; active

(1) Kelynack, T. N. "On the Occurrence of Pulmonary Tuberculosis in the Subjects of Alcoholic Neuritis." — *The Medical Chronicle*, 1895-6. Vol. IV., p. 180.

phthisis was present in fourteen, twelve males and two females; and active peritoneal tuberculosis in twelve, nine males and three females. Of these, six males and one female had involvement of both lungs and peritoneum. In five males and one female the lungs alone were affected, and in two males and two females the peritoneum alone. No less than twelve, or nearly 10 per cent. of 121 cases, appeared to die directly from tuberculosis. The average age of those in which active tuberculosis was limited to the peritoneum was nearly forty-seven years. The average age of those in which active tuberculosis was limited to the lungs was just over forty-four years. (1)

A STUDY OF HEREDITY IN ITS RELATION TO IMMUNITY AND SELECTIVE ACTIVITY IN TUBERCULOSIS.

(BY HERBERT MAXON KING, M. D., NEW YORK.)

In a paper, of which the foregoing is the title, the author has embodied the results of carefully recorded observations in two hundred and forty two cases of tuberculosis occurring in his own practice, where opportunity for close personal study into the immediate family histories and such other features of the several cases as would throw light upon the present inquiry were exceptional. He has endeavored to prove, in so far as possible by the limited number of cases under observation, that a history of tuberculosis in the parents instead of predisposing an individual to the disease, confers to a certain extent an immunity to it—an immunity which of course is but relative and not sufficiently protective, yet such as to deserve a more thorough and unprejudiced attention than has thus far been accorded the subject. After briefly summarizing in the usual way the family histories of his series of cases, the author devotes the chief space of his paper to an analysis of the progress of the disease in one hundred and three fatal cases out of the total two hundred and forty two. Of these fatal cases he finds that seventy six occurred among individuals of non-tuberculous parentage. The average duration of the disease in every case, from its earliest evidences to death, was 2.93 years. The other twenty seven fatal cases occurred among individuals of tuberculous parentage. The average duration of disease in these cases was 4.01 years, more than a year longer than in the former class, and this, it is to be observed, in a class which for obvious reasons may be fairly presumed to have contracted the

(1) See Kelynack, T. N. "On the Occurrence of Tuberculosis in the Subjects of Common Hepatic Cirrhosis."—*The Medical Chronicle*, 1896-7. Vol. VI., p. 262.

infection at a time considerably more remote from the date of death than would be the case among those of non-tuberculous parentage.

He cites the instances of tuberculosis outbreaks among negroes and Indians of the Far West of non-tuberculous heredity, in which resistance to the disease is lowest, and where a rapidly fatal termination is the almost unexceptional rule; and this in a climate to which are sent the more immune whites suffering from the disease, as a therapeutic measure.

The conclusions arrived at, by the author's observations, are:—

First, the percentage of consumptives having tuberculous parentage is actually smaller than that of those having non-tuberculous parentage, and is much smaller than would be more than accounted for by the additional danger of infection to which the former class is subjected.

Second, tuberculosis in the parents renders to no inconsiderable extent an immunity to the disease in the offspring, as is shown by increased resistance to the progress of the disease and increased tendency to recover in this class.

THE ROLE OF THE NASAL FOSSAE IN THE PROPHYLAXIS AND TREATMENT OF PULMONARY TUBERCULOSIS.

(BY DR. MAURICE MIGNON, NICE.)

When we consider the question of the prophylaxis of tuberculosis, we must recognize the fact that contagion takes place chiefly through the air. Air is the vehicle by which the microbes invade the organism far more frequently than is food, which can be sterilized by cooking. When the air is still infective, in spite of the use of spittoons, in spite of the practice of disinfection, in spite of every precaution intended to prevent the spread of the disease, the nasal fossae are still capable of arresting the danger that threatens us. The microbes that enter with the air are, in a large measure, arrested by the cilia of the nasal vestibule and by the very extensive and very irregular surface of the mucous membrane. One may thus recognize the bactericidal function of the nasal mucus, although it has been questioned by some authors. Clinical experience teaches, indeed, that the nasal fossae are much more resistant to tuberculosis than the rest of the respiratory tract, and even than the bucco-pharyngeal cavity. Insufficient nasal permeability (nasal obstruction from malformations or septal ridges, from hypertrophic or congestive rhinitis, from cysts, vegetations, adenoids, etc.), should therefore be reckoned among the dangers of tuberculous infection.

From the point of view of treatment the state of the nasal fossae

is of equal importance. As the nose allows more air to enter than the mouth, nasal insufficiency results in deficient oxidation of the blood and everyone knows how necessary oxygen is to the tuberculous. Entering by the mouth the air brings with it harmful microbes, which, accompanied by dust, favor the malady. Moreover, this air, insufficient and injurious, is modified, either in temperature or in pressure; it provokes bucco-pharyngeal, laryngeal and tracheo-bronchial inflammations which impede the action of treatment.

It is therefore absolutely necessary that we should be satisfied that patients presenting themselves for examination (especially those disposed to tuberculosis and those who are themselves tuberculous) are not suffering from any cause of nasal insufficiency. If any defect is present it should be remedied, and we should enjoin the patients to breathe solely by the nose as soon as they are able, for in this habit often plays a part. Instruction on the latter point should be included in the general advice which one makes a point of disseminating amongst all classes of the population.

ON THE TRANSFORMATION OF TUBERCULOUS SOIL DEFICIENT IN ACIDITY INTO AN ARTHRITIC SOIL WITH EXCESS OF ACID.

(BY DR. SAMUEL BERNHEIM, PARIS.)

The author commences by studying the character of the tuberculous soil, the bio-chemical condition of which should be well known to everyone at the present day. The measure of the mineral richness and of the chemical condition of the organism may in some degree be the measure of its resistance. But we know that the tuberculous patient possesses a soil deficient in mineral constituents, wanting in chlorides, lacking phosphates, and above all deficient in acids, whilst the arthritic patient has a soil that is over-mineralized, exceedingly rich in chlorides and superabundant in acidity. That is to say, in chemical language, these two soils are in inverse proportion to each other. Similarly, from a clinical point of view, there exists a kind of antagonism between tuberculosis and the arthritic diathesis. Phthisis is rare among arthritics and of benign manifestation in them. From these first data—chemical, biological and clinical—the author draws numerous therapeutic deductions. It is thus, according to him, that the system of sanatoria, the absolute rest, the abundant feeding, the high altitude cure, have no other end and no other effects than the transformation of the soil. All these beneficent factors which have less effect on the bacillus than on the general system, tend to increase the organic acidity of the patient. And, in fact, the author has submitted a certain number of

patients to complete repose and he has proved in their case, at the end of a certain period, the existence of a very evident increase in urinary acidity. Similarly, the meat cure, so highly recommended by MM. Richet and Héricourt, does not act by means of antitoxins, but by a transformation of soil, the acidity of which it enriches.

After thus giving an interpretation of facts M. Bernheim adds that it is possible to obtain this transformation of soil, especially in the case of tuberculous patients who are treated early, by a hygienic and dietetic regimen, and by saturating the general system with a powerful acid such as phosphate of creasote or phosphoric acid. At the anti-tuberculous dispensaries at Paris he has observed a large number of patients in whom he has frequently estimated the urinary acidity. Now he has proved that under the influence of phosphate of creasote, taken in doses of three grammes every two days, the acidity rapidly increases and the general condition improves; whence we are right in concluding that it is possible, by artificial methods, to transform a soil deficient in acid and favorable to tuberculous evolution into a hyperacid soil, into one that is antagonistic to Koch's bacillus. This transformation which is, according to the author, the sheet-anchor of the subject of phthisis, should be sought by means of, and perhaps obtained by, a hygienic and dietetic regimen as well as by powerful therapeutic measures.

FREQUENCY AND SIGNIFICANCE OF TUBERCULOSIS OF THE TRACHEAL AND BRONCHIAL GLANDS IN MILIARY TUBERCULOSIS OF CHILDREN, AND IN TUBERCULOUS MENINGITIS.

(BY DRS. P. HAUSHALTER AND A. FRUHSCHOLZ, NANCY.)

In 78 autopsies of miliary tuberculosis in children below 12 years of age, tuberculosis of the tracheal and bronchial lymphatic glands was met with 74 times (about 95 per cent.); in 67 cases there was tuberculous meningitis, and in 64 of these affection of the glands was present.

This glandular affection has always the character of an old and caseous tuberculosis; in 29 cases it coincided with old tuberculous lesions of the lung, generally localized; in 44 cases it formed the only tuberculous lesion present.

In almost all cases, therefore, the origin of the bacillary infection which ends in the miliary form and in meningitis, is in caseous tracheal and bronchial glands. The frequency of this lesion is a proof of the importance of aerial contagion of tuberculosis in children.

How does this tuberculous affection of glands, which is more developed and deeper seated in the miliary than in any other form of tuber-

culosis, end in the bacillary infection of the blood, which is considered almost the sole cause of the miliary form and of the meningitis? In spite of the intimate relations of the vessels at the base of the heart with the masses of caseous mediastinal glands—relations which are shown by the drawings exhibited—we have failed to find macroscopically or microscopically, any lesion of the walls of the vessels that could explain the direct passage of the bacillus from the lymphatic glands into the blood.

The bacillary infection of the blood takes place through the lymphatic system; in the very brief time occupied by the passage of the bacillus-bearing leucocytes from the caseous lymphatic glands of the mediastinum into the blood stream, passing as they do by the efferent lymphatics, and by a short section of the thoracic duct or of the great lymphatic trunks—the destruction of the bacillus has not time to be effected.

Even in many of the cases in which pure meningitis exists, without generalized miliary infection, and in which one would therefore be tempted to look for the origin of the infection, not in the blood vessels, but in the lymphatics, it is probable that there exists a general bacillary infection, the manifestations of which are not appreciable to the naked eye or are exceedingly scattered. This we have been able to prove on several occasions.

ON THE USE OF ROENTGEN RAYS FOR DIAGNOSTIC PURPOSES IN PULMONARY TUBERCULOSIS.

(BY DR. BONNET LÉON, OF PARIS.)

The author presents the results of more than 600 personal observations. Most of these cases were examined from 1897 up to the present time, and have been, as a preliminary, submitted to the auscultation of various of his colleagues. By the use of the fluorescent screen alone the diagnoses have been confirmed in ninety eight cases out of a hundred, and very frequently even at the very outset of the disease.

This very certain and very rapid method is therefore to be recommended, especially when a large number of patients are to be examined at a time in noisy places, such as dispensaries, or in the medical examination of army recruits, etc.

Dr. Bonnet Léon also describes a new process by which an easy and almost general diagnosis may be made in the pre-tuberculous period.

At this period neither screen examination, radiography, auscultation, the usual methods, nor the microscope, can reveal the least opacity, the smallest modification of the vesicular murmur, nor the bacillus.

A means of diagnosis is found in the attentive study, by means of the radioscope, of the function of the diaphragm and the inspiratory

muscles. If one examines a patient apparently in a good state of health, or simply affected by weakness—such, for example, as dyspeptic or neurasthenic conditions—one must follow the movements of the thoracic cage, the degree of clearness of the lungs, and especially the action of the diaphragm during the two phases of respiration.

If one finds anomalies in this operation in the synchronism, and amplitude of movement of the two halves of the diaphragm in their rise and fall, or in their curvature, one can generally, in the absence of any other sign, give a diagnosis of a predisposition to or commencement of tuberculosis, unless an evident cause for these anomalies can be discovered.

Unless an ulterior cause can be found it nearly always means an unrecognized diaphragmatic pleurisy, imperceptible bacillary alterations of pulmonary tissue or slight palsy, caused by the toxin coming from disseminated tubercles.

A large number of people, apparently in good health who were examined between 1897 and 1900, and exhibited only the anomalies in question without any evident cause, on being reexamined some months or years later, showed opacities and manifest signs of tuberculosis, either on the side corresponding to the functional trouble or on both sides.

Dr. Williams, of Boston, has pointed out the lessened lowering of the diaphragm on the side corresponding to a pneumonic or tuberculous lesion, without noticing the value of the other anomalies, and describes this diminished lowering as contemporaneous with the visible alteration in the lung.

A chart of these anomalies is exhibited in the Museum of the Congress on the plan of the Dispensary at Montmartre, presented by Professor Landouzy.

The same functional disorders are clearly visible in advanced tuberculosis and furnish most valuable indications for *prognosis*. Patients having limited lesions but having insufficient respiration are victims of a rapid form of the disease, whilst other patients with extensive lesions enjoy relatively good health when the function of the diaphragm is almost normal. These widely differentiated cases are often seen.

Dr. Bonnet Léon concludes from a diagnostic point of view that a radiosopic examination should be made of all patients predisposed to tuberculosis by heredity, alcoholism, contagion or surroundings, and from a therapeutic point of view he would prescribe the methodical exercise of the diaphragm and the muscles of inspiration by respiratory gymnastics in accordance with the results of the radiosopic examination.

Experience has already proved the importance of these conclusions.

DISCUSSION OF THE THERAPEUTIC AND DIAGNOSTIC VALUE OF
TUBERCULIN IN HUMAN TUBERCULOSIS.

(BY G. A. HERON, M. D., OF LONDON.)

Dr. Heron after reference to the announcement of the discovery of tuberculin by Professor Koch in the autumn of 1890, speaks of the subsequent outcry against the remedy which had for its chief cause the condemnation of its use by Virchow.

"The patriarch of present-day pathologists said, that in his opinion the use of tuberculin was fraught with danger to the patient. His reason for making this statement was that he had seen in the bodies of consumptives, who in life had been treated with the old tuberculin, evidence which convinced him that the drug caused destruction of the tissues around tuberculous centres and so set free the bacillus to do its work upon healthy tissues. Virchow maintained that, had the remedy not been used, the bacillus might have rested harmless, encapsulated, as we know it often is, by "tissues that have undergone an indurative process, and become fibrous." The author states: "Of Virchow's objections to the employment of tuberculin, I can only say that in my hospital experience of its action there has been observed no evidence of resulting spread of disease to seemingly healthy organs or to neighboring tissues."

In the opinion of the author, tuberculin has fallen into discredit:

1. By its frequent use in unsuitable cases.
2. By its administration in too large doses.
3. By neglect of the rule that a dose of it should never be given until the patient's temperature has been normal for the previous twenty-four hours at least.
4. By neglect of the rule that the dose of tuberculin should never be increased, but, on the contrary, should be diminished, when its administration has been followed by a rise of temperature.
5. By the prejudice raised against the remedy among both doctors and patients because of the severity of symptoms which not seldom follow its use.

Dr. Heron continues with a report of fifty-seven cases treated by him since 1890, at the City of London Hospital for Diseases of the Chest. Fifty-one were cases of pulmonary tuberculosis, and six, of lupus vulgaris. Five of the lupus cases and twenty-seven of the others were treated with old tuberculin.

The new tuberculin was employed in one case of lupus and in the remaining twenty-four of pulmonary disease.

At the end of the year 1900 seventeen of the fifty-one cases of lung disease had been lost sight of, practically from the time they left the

hospital. Sixteen of the remaining thirty-four were then known to be well and earning their living. Ten of these sixteen cases of recovery are known to have remained well and able to work for seven years; three for over three years, and three for nearly two years. Other patients remained able to work for periods varying from a few months to eighteen months.

Thirty-two of these fifty-one cases left hospital in 1891. Seven years after, in June, 1899, the information concerning these cases, obtained for the most part by the assistant medical staff and nurses of the hospital was as follows:

Eight of them were dead. Ten were well.

One relapsed in 1897, having remained well until the autumn of that year. Thirteen were lost sight of very soon after they left the hospital. These cases were all treated by the old tuberculin and their cases are dealt with in some detail in a paper I contributed to Vol. XIV. of the Transactions of the Medical Society of London.

In addition to these 32 cases five cases of lupus vulgaris were then treated by the old tuberculin. These all did remarkably well up to a certain point, and then, at longer or shorter intervals, suffered relapse.

Some of these cases of lupus vulgaris relapsed while under the influence of tuberculin. It is certain that at this period of the history of tuberculin, cases of lupus received unnecessarily high doses of the drug. When relapse took place in, for example, three of these cases, one of them had gained ten pounds in weight, and was taking 400 mg. doses of tuberculin; the second was taking 1000 mg. doses, and had gained ten pounds in weight; the third had gained 18½ pounds in weight and was taking doses of 1000 mg. These large doses were given once in a week or a fortnight, and were not followed by high temperature, nor by other symptoms due to the action of the drug. The patients had been respectively 124, 128 and 135 days in hospital, and had received in that time the first named 50, and the other two each 59 hypodermic injections of the old tuberculin."

"It seems to me difficult to believe that these large doses could have exercised any material influence in the direction of favoring any tendency to relapse. The evils said to result from tuberculin are ascribed to its violent effect upon the tissues by which during severe reactions, infection of neighboring healthy tissues, is, according to Virchow's observations, apt to happen. But in these cases there were certainly no reactions when large doses of tuberculin were given, beyond slight redness around the site of the lupoid patches. There were no headaches, no rigors, no high temperatures; and yet, under these

circumstances, a relapse did take place, and while the drug was being administered. If the tubercle bacilli were let loose into the tissues, near the patches of lupus, as a result of severe reactions early in the treatment of these patients, then the drug should, one may reasonably urge, have had ample opportunity to exercise a beneficial influence, owing to the administration of the very large doses which were not followed by reactions worth noticing. Certainly, in all but one of my lupus cases tuberculin seemed after a certain time to lose its power for good. I confess I have never been able to understand why, in cases which had improved so much, certainly because of treatment by tuberculin, relapse should have occurred while the treatment was in full use.

"Since March, 1897, I have used only the new tuberculin. During that year ten cases were so treated in hospital.

The other eight cases of this year were made up of seven examples of tuberculosis of the lung, and one of lupus vulgaris. They all did very well, and without exception, left hospital, urging as their sole reason for leaving their fitness for, and their wish to resume work. In December, 1900, three years after treatment, the following was the result of the use of tuberculin in these cases:

Two were dead; both of them recognized as being hopeless cases from the first.

Three were well and supporting themselves by their work.

Three were lost sight of.

One remained well until lately, and returned to hospital a few weeks because of a recurrence of disease.

No. 10 of the patients of the year 1897 is worthy of some notice. It is the only case of lupus that I have treated with the new tuberculin, and it is the only case of that disease which in my hands, has not suffered relapse. He was a coachman, 27 years of age, admitted to hospital on April 17, 1897, with lupus vulgaris affecting the whole of his left nostril, within and without; about one half of the anterior part of the right nostril, within and without; and the bridge of the nose between the alae nasi, excepting the tip of the nose. The left lip close to the middle line, at junction of lip and alae nasi, was also diseased. There was another affected part of the skin three-quarters of an inch in front of the lobe of the right ear; this patch was about the size of a sixpence. Treatment with new tuberculin was commenced April 20, 1897, and completed August 4, 1897. The total quantity of tuberculin injected (hypodermically) 126.5 mg. given in sixty-three injections; the doses ranged from 1.500 mg. to 4 mg. On July 2, scar tissue only was seen over sites of lupus patches, excepting the patch on the left lip;

this had entirely healed sixteen days earlier. On February 25, 1898, I showed this patient to the Clinical Society of London. He was then free from recurrence of his disease. To complete this part of the case I may say he was quite well on June 9, 1891."

Dr. Heron reports an additional ten cases treated with the new tuberculin in 1899—five women and five men. Two of the women are still in good health, two are reported to have broken down in health and the fifth has been lost sight of.

Of the men one continued well for more than a year after treatment, but appears to have recently had a relapse. Another is said to be able to work. The third died November 16. Probably he had a relapse. The fourth was reported to be very ill a year ago. The fifth is working as a photographer's assistant, but says he had spitting of blood two months ago.

Dr. Heron requests attention to a case of great interest, as follows: "A girl, seventeen years of age, was submitted to a test injection of tuberculin because her physician had a doubt as to whether or not she had tuberculosis. She was thin and undersized. There was dull percussion over both lungs, and abundant crepitant râles filled them both from apices to bases. Her liver and spleen were enlarged. No tubercle bacilli were found in the sputum. When the question of giving this girl a test dose was discussed, it was decided that lest her symptoms should be due to tuberculosis, only a minute dose of old tuberculin should be given. Therefore, instead of the usual initial dose of 1 mg., one-third part of a mg. was injected in the usual way and with, of course, strict attention to aseptic precaution.

"I show you an enlarged copy of this patient's temperature chart. The temperature was taken in the mouth, and the chart records it morning and evening for eleven days previous to the injection of the tuberculin. From the time of the injection onwards, the temperature was taken every four hours. Before the injection, the temperature, you will observe, ranged between two and four points below 98 degrees up to a point or two above 99 degrees. After the injection the temperature never rose above 98 degrees, and it fell on the last day to 96.4 and 97. Respiration rose gradually from about twenty to double that rate. The heart's action became feebler and feebler until she died twenty-seven hours after the giving of the injection. There was vomiting two hours, and again three hours after the injection. For the last twenty-four hours of life the patient had diarrhoea, not bloody.

"It happened that two other women, and two men each received the usual test dose of 1 mg. taken from the same bottle that had been used in this fatal case. Both of the women had moderate reactions, but

one of them became jaundiced, and had a considerable amount of vomiting. The other woman had a rise of temperature to 102 degrees F. but no other symptoms, excepting only a slight sense of headache. Both the men had severe reactions with rigors, and a rise of temperature in one case to 104 degrees, in the other to 102 degrees. The man whose temperature reached 104 degrees had vomiting which, at intervals, continued for five days.

"I need not say, a series of cases like this demanded a most rigid investigation as to the cause of these deplorable results, plainly associated as they were with the injection of these test doses.

"As regards the case ending in the death of the patient, that the death was not due to tuberculin seems beyond a doubt, for dangerous symptoms have so far as I know or can ascertain, never been observed to follow a dose of less than 1 mg. The characteristic of the action of tuberculin is a rise of temperature. Here the temperature fell. Vomiting is not a frequent symptom of a severe reaction, but here there was no evidence of reaction due to tuberculin. Excepting only this case, I have no knowledge of diarrhoea having ever followed upon the use of tuberculin. But the symptoms of jaundice and vomiting in the other woman and the five days of occasional vomiting which occurred in the man, made it certain something was wrong with the tuberculin used in these cases. It was contained in one of several bottles all filled with tuberculin of the same date of manufacture; the date being one month and eleven days previous to the giving of injections. All these bottles were sent to Dr. Macfadyean of the Jenner Institute. They were unopened, excepting, of course, that one which had already been in use.

"He examined their contents by every method known to bacteriologists. He says in his report: 'The tuberculin was injected into guinea pigs; 1 c.c., 0.5 c.c. and 0.2 c.c. No toxic effects were produced, nor any noticeable symptoms.' Dr. Macfadyean ends his report with these words: 'I have not, therefore, been able to trace any abnormal or deleterious property in connection with the samples of tuberculin.'

"The doses of the drug were made up by a most efficient druggist, who was well accustomed to the preparation of minute doses, dispensed with the use of the metric system of measurement. Careful inquiry made it certain there could have been no error in the dosage. Of course every effort was made to secure a post-mortem in this case, but the necessary permission could not be obtained.

"One may speculate upon the cause of this death; and it may be suggested with much force of reason that it was due to widespread and

advanced degeneration of the intestinal glands. But the absence of post-mortem evidence and the want of all help from the bacteriological examination must, I fear, for the present, bring us face to face with a deadlock in seeking to explain this case.

"The fact that this girl showed no reaction proves to the minds of, I think, all those who have much experience in the use of tuberculin as a test for the presence of tuberculosis in human and other animals, that it is highly improbable she had tuberculosis. What, then is the diagnostic value of tuberculin? That it produces its characteristic reaction wherever tuberculosis is present, there can be no doubt. That it rarely fails to react where there is tuberculosis is so true, that cases in which failures are recorded may safely be neglected. In my own experience of this use of it I have never seen any evil consequences follow its administration. It produces no evil effects in such cases as disease of the larynx, nor in kidney disease with albuminuria and granular tube casts, nor in disease of the bladder, nor, so far as I know, in any condition of disease, whether tuberculous or not. As an illustration of the practical usefulness of tuberculin as a test in cases always difficult and often impossible of diagnosis by ordinary methods, I would refer to the excellent work done in this direction by Dr. Eric France of the London County Asylum, Claybury. His object was to ascertain, with certainty, who among the insane inmates of the asylum had tuberculosis. For this purpose he tested fifty-five of his patients with tuberculin. Characteristic reactions occurred in forty-five of these cases. Thirty-four of them eventually died, and twenty-nine of these thirty-four were submitted to post-mortem examinations, with the result that, as Dr. France says, 'Active tubercle was found in every case.' Ten of the fifty-five patients did not react. Five of those died, and post-mortem, says Dr. France, 'No trace of tubercle found in any; five still alive and healthy.' Here is his expression of opinion on this matter in his own words: 'I injected fifty-five cases with tuberculin, and personally I am satisfied, not only with the accuracy of its diagnostic power, but also with its entire harmlessness, both in the tuberculous and the non-tuberculous'."

THE USES OF TUBERCULIN.*

(BY DR. CHARLES DENISON, DENVER.)

Divided into diagnostic and immunizing or therapeutic. The composition of the glycerine extract and its reactionary effect described. Diagnostic proficiency and observance of technique required in its use.

The method of administration and size of dose for diagnostic purposes. The reaction determined by (1) temperature rise, (2) systemic effect, and (3) local auscultated sounds in affected lung tissues.

The immunizing or therapeutic effect of tuberculin, and reasons why the *direct* method (extracts) is preferable to the *indirect* (animal sera).

Descriptions given of the different preparations: Tuberculin R. (Koch), Tuberculocidin (Klebs), Antiphthisin (Klebs), Tuberculinum Purificatum (von Ruck), Watery Extract (von Ruck). Tables of results, giving the author's ten years' experience with 213 patients; also comparative tables.

A discussion of the *modus operandi* of immunization. Chiefly based upon the theory that the toxins are insufficiently or with difficulty absorbed (during the pre-tuberculous and infiltration stages) in order to sufficiently stimulate the healing process. Hence the utility of this form of immunization.

THE ALIMENTARY CURE OF TUBERCULOSIS.

(BY DR. SAMUEL BERNHEIM, PARIS.)

The author insists on the importance of the alimentary cure of phthisis, and on the place which it should occupy in the therapeutic triad of Brehmer. The necessity for restorative feeding, already proclaimed by former clinical teachers, should, however, be carefully studied and not put into practice blindly.

It is not sufficient to merely speak to a tuberculous patient and to order him to eat often and much, and to take a very rich diet. Before imposing so vague a regimen, the clinician should take an exact and precise account of the digestive power of the patient, for cases vary in this respect. In some we find defect of acidity, in others hyperacidity; in some excessive dilatation; in others diminution in size; in some total anorexia, in others again an absolute intolerance of food. The author insists on this point, not generally admitted, that the stomach of the tuberculous patient is often the seat of tuberculous lesions, or that

*"Ten Years' Experience with the Tuberculins," by Dr. Denison, has already appeared in this Journal, for April of the current year.—Vol. III, No. 2, p. 111.

it is at least the subject of tonic disorders of bacillary origin. It is therefore useful to vary the means of procedure according to the requirements of each patient.

After having studied this first section, Dr. Samuel Bernheim reviews the different foods most to be preferred in tuberculosis. He studies their richness in nitrogen and mineral salts, and parallel with this general study of foods he brings into relief the principal factors producing excess of katabolism in the patient. The clinician will be able for himself to draw from this clinical and biological study the practical conclusions which have in fact been summed up very precisely. The author states that if the tissues and the debilitated organism are to be repaired as speedily as possible, it is imprudent to exact any considerable effort on the part of the stomach at the commencement. This organ should be protected with "pious care," and not be brutally overworked. No good is served by putting inside a patient an enormous quantity of food; above all, it is necessary to give him nourishment that he is capable of digesting and assimilating. By commencing this nourishment prudently and methodically we arrive at the stage of tempting the stomach of the patient, and the patient finishes by taking his food himself with relish and benefit.

In conclusion, Dr. Bernheim disapproves of an exclusively meat diet, for although these foods contain a large quantity of nitrogen, they contain a very small proportion of the numerous salts and potent acids so indispensable to the renewal of the body. "It is not a question of merely fattening the soil of tuberculous patients; it must also be enriched by the numerous organic salts indispensable to vitality;" and to attain this end a mixed diet of nitrogenous and carbonaceous foods is absolutely necessary.

THE PRINCIPLES OF TREATMENT OF TUBERCULOUS LARYNGITIS.

(BY ST. CLAIR THOMSON, M. D., OF LONDON.)

The statistics of the pathological department of the Brompton Consumption Hospital show that the larynx is affected in over fifty per cent. of the cases which succumb to pulmonary tuberculosis. As 70,000 persons die annually in the United Kingdom from this disease, at least 35,000 of them would have claimed our help in diminishing their sufferings from tuberculosis of the larynx. The statistics of averages warrant us in saying that there are in this country at least 75,000 who require our aid in arresting or easing the progress of tuberculosis of the larynx. The wide-spread character of this disease is therefore in itself a claim upon our attention; and when we remember the long drawn-out suffer-

ings which may accompany it, and the youth of the majority of its victims, our humanity is keenly stimulated in their behalf.

The moment seems opportune for briefly reviewing the principles which may guide us in the treatment of tuberculosis of the larynx, for not only must we readjust older views to the modern light which has come upon the scene, but such an occasion as the present congress rarely occurs for supplementing the experience of the laryngologist by that of the general physician and the pathologist. That this review is very necessary has been impressed upon me by the perusal of a large number of the most recent text-books on laryngology, few of which contain any reference to the treatment of laryngeal tuberculosis by modern hygienic methods. The frame of mind of many laryngologists is reflected in a recent paper by Dr. Johann Sendziak, in which he makes mention of the "rational—that is, the surgical—treatment" (1) of this disease, as if any method of treatment short of surgical was not worthy of being denominated as reasonable, and as if hygiene and rest were of no avail, and the *vis medicatrix naturæ* a myth.

Our principles of treatment are guided by clinical experience, but, when available, are based on pathological knowledge. The pathology of tuberculous laryngitis is rendered difficult by the complexity of the anatomical arrangement of the larynx. The varieties in the structure of the mucous membrane and submucosa, the functions it performs, the proximity of tendons, ligaments, muscles, cartilages and joints, the disposition of lymphatics and vessels, the occasional movements required in deglutition and the constant rhythmic action of the vocal cords in respiration, are all points which have to be taken into consideration. While the morbid histology of tuberculosis can be so readily studied in the larynx that Virchow recommended it as one of the best opportunities for observing the process, yet the complicated nature of the larynx renders an investigation of the anatomical conditions an equally important part of our task.

Tuberculous affections of the larynx have been classified under four categories:

- (a) Superficial ulceration commencing from the surface;
- (b) Infiltration, followed by
- (c) Ulceration; and
- (d) Tumour formation, or tuberculoma.

This classification is of course somewhat arbitrary. It is seldom that two or more of these forms are not combined when a case first presents itself. As there is little doubt that in the large majority of

(1) Journal of Laryngology, May, 1901.

cases infiltration precedes every other process, it is deserving of particular study as to its situation. It commences in the subepithelial layer, and when it takes place in regions where the mucous membrane is closely adherent to deeper tissue, and particularly to cartilage—as in the epiglottis, vocal processes, and arytenoids—it is very apt to spread to deeper parts, leading to perichondritis and necrosis of cartilage. Although the mucous membrane of the vocal cords is closely attached to the underlying tissue, the absence of subjacent cartilage renders infection of this part of the larynx a less rapidly destructive process. On the ventricular bands there is still less danger of immediate spread to adjacent cartilage.

Of all the various situations in the larynx the most frequently attacked is that of the arytenoids and the neighboring inter-arytenoid space. Lake found this part affected twice as often as the vocal cords, and three times as often as the epiglottis and ventricular bands. (1)

In the early stages of such cases the vocal cords not only show a want of tension, but careful inspection will show that their movements are impaired both in adduction and in abduction. This tendency to remain in the natural cadaveric position (i. e., position of rest), the inter-arytenoid thickening, and the consequent disphonia or aphonia, have inclined W. Fowler to look upon tuberculous laryngitis as chiefly a joint disease. He supports his view by the record of between forty and fifty autopsies of tuberculous laryngitis, and as his knowledge as a laryngologist helped to render these examinations very complete, I think the results deserve careful consideration. "In every case," he writes, "the greatest seat of the mischief was in the immediate neighborhood of the crico-arytenoid joint, and the joint itself was always implicated. The deepest part of the ulcer, when ulceration existed, was always immediately in front of the joint, and the joint not only communicated with the floor of the ulcer, but was also more or less disorganized. In many cases the arytenoid was a loose piece of dead cartilage." (2)

The pathology of laryngeal tuberculosis requires still further study, but in any case we seem warranted in assuming that, as in other parts of the body, the first process is one of infiltration. Universal clinical experience and pathological observations concord in establishing the fact that in a large majority of cases this infiltration first takes place in or about the arytenoid joints. Other parts are occasionally attacked primarily; the epiglottis less frequently than any other.

(1) *Laryngeal Phthisis*, London, 1901.

(2) "*Intercolonial Medical Journal of Australia*," October 20, 1898.

Leaving now for a moment the pathological aspect of the subject, let us consider it from the result of treatment. Writing in 1889, Morell Mackenzie observed, "It is not certain that any cases ever recover," and he states that he knew of only four in which he had reason to believe that the disease was entirely arrested. (1)

This view has been somewhat modified in the succeeding twenty-one years by the work of Moritz Schmidt, Krause, Heryng and others. Their work has, unfortunately, diverted attention too exclusively to the possibility of exterminating the disease of the larynx by knife and caustic. Recoveries have, indeed, been claimed under various treatments, but we must remember that arrest will take place in the larynx as elsewhere without any local treatment whatever. When reaction and resistance of neighboring tissues are sufficiently vigorous, the advance of infection is checked by the fibroid change, which is the natural and desirable process of cure. In many cases the recovery is deceptive; partial cicatrization of an ulcer may take place in one part, or retrogression of an infiltration occur in the region visible in the mirror, while the process may be spreading in the depths of the tissues, or in such parts as the ventricles of Morgagni and the subglottic region. Besides, the foreshortened image we see in the mirror is a very unsatisfactory picture of the posterior laryngeal wall—the most important region in tuberculosis—and is always inadequate as regards the parts lying below the cords. Every one who performs a laryngo-fissure, or opens a larynx on the *post-mortem* table, is prepared to find disease invariably more extensive than it appeared in the laryngoscope.

What remains to us of all the various methods of local treatment which have from time to time been vaunted as curative of laryngeal tuberculosis? Their very number is eloquent of their insufficiency, and although some cases may have recovered under treatment, and many may have been locally relieved, yet we need hardly stop to consider whether the various sprays, pigments, insufflations, submucous injections or intratracheal injections, had any more than an alleviating effect, or whether in the majority of cases, the irritation and reaction they produced did not far counterbalance any possibility of good.

None of the numerous methods which have from time to time secured some attention have ever appeared to me sufficiently rational to make them worthy of an extended trial. On the other hand, their disadvantages and uncertainties were only too apparent. I have therefore been compelled to appeal to the experience of others in this matter,

(1) "Diseases of the Throat and Nose," vol. i., p. 383.

and in doing so will refer only to what we may term the lactic acid and the surgical methods of treatment.

Applications of lactic acid to the tuberculous larynx have obtained such a vogue in the last ten or twelve years that the method has been applied *à tort et à travers*, practitioners in many cases persevering with it while the patient was being prevented, through its effects, from improving generally, or was even steadily deteriorating in health. In many cases I have known of its being applied over unbroken mucous membrane, covering deep infiltrations, or evident perichondritis, the surgeon apparently not stopping to ask himself how this superficial caustic could affect these deep processes, or do more than distress the patient and hurry on the progress of the disease. And now Freudenthal, who used it freely, states frankly that "it ought to be dispensed with as antiquated and barbarous torture of the patient." (1)

In 1899 Freudenthal subjected twenty-nine cases to surgical treatment without being able to record one single cure. (2) He then treated his cases of tuberculous laryngitis without curettage, and after a year's observations, he wrote, "I believe my patients are just as well and perhaps better off than they would have been with the operation." (3)

The extensive and trustworthy experience of Jonathan Wright has led him to the following statement: "The permanent radical cure of the local lesion of tuberculous laryngitis is not materially hastened by the various methods of treatment in any but an insignificant number of cases."

That a certain number of apparently permanent cures have been effected is undoubted. I have myself verified such a case both before and after treatment, which was shown by Dr. Lack to the Laryngological Society of London (4) but the chief point to realize is that even the most enthusiastic supporters of the surgical treatment of tuberculous laryngitis admit themselves that the majority of cases are unsuitable even for attempting operative measures. We must also remember that in this small minority of cases the method is painful and distressing; it cannot but react unfavorably on any general condition; and the result is extremely doubtful.

It seems to me that the treatment of the last decade has been based too exclusively on the bacillus as the one and only etiological factor, and that due regard has not been given to more general considerations.

(1) *Journ. of the Amer. Med. Assocn.*, 16 March, 1901.

(2) *Philadelphia Med. Journ.*, 25 March, 1899.

(3) *Medical News*, New York, 19 Jan., 1901.

(4) *Trans. Laryngol. Soc.*, London.

In indicating the slight and unsatisfactory results which have been gained from the direct treatment of laryngeal tuberculosis I must be understood as only deprecating much of the treatment in so far as it has been regarded as effecting a local cure. Where the progress of the disease—in the lungs and in the larynx—is not stimulated by local interference then many measures are available for symptomatic treatment, and we are well equipped nowadays for soothing laryngeal irritation and cough, easing pain, facilitating swallowing, and thus contributing to the general treatment and the possibility of cure.

We must look elsewhere at present than to surgical measures for a prospect of progress in the treatment of tuberculosis of the larynx. This progress is ready to hand in the making of an earlier diagnosis of local infection. The present is hardly the occasion, even if time permitted, for me to enlarge on the symptoms of the early diagnosis of laryngeal tuberculosis. Besides, the most detailed description of the laryngoscopic appearances could hardly portray a condition which would be recognized by any but an expert, so slight are the early changes and so variously are they combined. "In general," says Grünwald, "it may be said that it is impossible to teach anyone theoretically how to make a diagnosis from the picture in any given case, because, in order to arrive at a decision one must first learn the development of many successive pictures by long personal observation. Not the picture of today, but that of yesterday, and that of tomorrow, must decide for or against laryngeal tuberculosis. (1) But it is not only from the laryngoscopic appearances that a diagnosis of early local tuberculous infiltration, or of even pre-tuberculous laryngitis, can be made. We must make a careful and thorough examination of the entire body, and pay careful attention to such symptoms as anaemia, anorexia, dyspepsia, loss of weight and strength, hurried pulse and evening rise of temperature. The previous history of the patient, particularly in regard to hemoptysis and pleurisy, must be taken into consideration, and the family history should not be forgotten. There are many other indications of early tuberculosis, and these, together with the indications for the employment of tuberculin as a diagnostic test, I must at present leave out of consideration. In this way evidence can often be obtained which will complete the diagnosis of a laryngeal condition which might otherwise be treated as a simple catarrh. In the absence of positive confirmatory symptoms, and of other adequate explanation of laryngeal symptoms, we must treat suspicious cases by measures

(1) Atlas and Abstract of the Diseases of the Larynx, 1898.

that we know now will avert a condition which, once well established, is almost always incurable. In doing this we are but working along the lines and making the same plea for early diagnosis which has been so forcibly advanced in recent years in the subject of pulmonary tuberculosis.

Once the early diagnosis is made the treatment is exactly the same as that now employed in pulmonary phthisis—the sanatorium treatment in what should practically be the open air, with rest, hygienic surroundings, and food. To this must be added, more or less, strict insistence on voice rest. This is found to be beneficial in many cases, even when the larynx is not affected. It must be much more so in the laryngeal cases, when we realize that in the majority of instances the focus starts near or in the circo-arytenoid joints.

Catarrhal or obstructive affections of the nose and throat, and any intercurrent conditions of the larynx, must, of course, receive careful attention, and it is, therefore, very desirable that those in medical charge of sanatoria should be skilled in practical laryngoscopy. But the important principle to bear in mind is *primum non nocere*, for even a clumsy examination of the throat may produce more irritation and harm than any treatment can counterbalance.

Briefly recapitulated, the principles to bear in mind in tuberculosis of the larynx are as follows:—

1. Pathology and clinical experience show that in the majority of cases the focus of infection is near or in the crico-arytenoid joint.

2. Many cases present themselves only at a stage when the possibility of effecting a cure by local measures is quite untenable.

3. The principle of *primum non nocere* should be constantly kept before us, as many measures which have been tried in this affection have only distressed the patient and hastened the disease.

4. In the light of present knowledge and therapeutic resources, the most rational principle is to attempt to make an early diagnosis of the disease while in an incipient stage. Any persistent or suspicious laryngeal catarrh should be treated seriously on even a presumptive diagnosis.

5. Once diagnosed, the patient should be treated on the principles laid down in the modern method of sanatorium treatment.

6. Symptomatic treatment should be directed to any irritative, catarrhal, or obstructive condition of the air passages.

7. In addition, silence should be enjoined, the disuse of the voice being proportionate to the degree in which the focus of infiltration approaches or interferes with the arytenoid joint.

8. In cases where the situation or extent of the disease does not warrant an expectation of complete arrest of the process, treatment should be symptomatic, and in many such cases the sanatorium treatment is uncalled for.

TUBERCULOUS, LARYNGITIS AND PREGNANCY.

(BY DR. A. KUTTNER, BERLIN.)

The influence which pregnancy exercises on tuberculous laryngitis has, until, now, nowhere or at any time, been thoroughly estimated. In the literature, distributed among four authors, are to be found seven cases which can be used to exemplify the clinical picture which results from the combination of pregnancy and tuberculosis of the larynx. There has, however, so far, been a failure to deduce from the comparison and critical study of the different cases any conclusions which, if not applicable to every single case, can yet furnish general rules for guidance. This want has surely cost many a sacrifice which could have perhaps been avoided by a better appreciation of the situation.

The purpose of this lecture is to offer a suggestion as to how this bad state of things can be practically remedied.

The material which the lecturer was able to bring to bear on the situation consists of fourteen minutely described cases, and about ten or twelve cases of which more exact details could not be brought forward. Of these fourteen cases seven have already appeared in medical literature; all the remaining data are based partly on the observations of the lecturer, and partly on inquiries which the lecturer has instituted amongst a large number of colleagues of wide experience. The lecturer feels himself especially indebted to Herrn B. Fraenkel and Gusseron for kindly allowing reference to their observations.

The results of this investigation were as follows:—An hereditary tendency is certainly not authenticated in all cases. With three women primary lung disease was clearly indicated before the beginning of pregnancy; in the eleven other cases there was no disease, or only a minimum, shown in the lungs. Laryngeal disease existed in one case before conception, in two cases it appeared in the sixth month, in eleven cases in the first half of gestation. Both in the case of the first and later conceptions the disease appeared in the same way. One woman who had suffered earlier from laryngeal tuberculosis with exceedingly slight affection of the lungs, and who remained quite free from every complaint for fully three years after her recovery, became ill again immediately after the onset of pregnancy.

No child was apparently carried to full time; three were born in

nine months, eight in eight months, three in seven. All the children were born alive. As to the subsequent fate of five of these, information is wanting; of two the lecturer can testify that they still live (one seven months old suffering from severe whooping cough; the second, nearly two years old, is healthy). Seven children died, some immediately after birth, some, at the latest, at three weeks old, thus making out of the nine children who came under the lecturer's notice, 77 to 78 per cent.

The fourteen women, about whom more exact details are to hand, all without exception died, some immediately after parturition and some, at the latest, two months afterwards.

Of the cases not so exactly recored almost all recovered, at least partly, after parturition. It will be a matter for a later inquiry to settle, exactly what proportion of cases survive the period of pregnancy complicated by the dangers of tuberculous laryngitis.

The treatment usually undertaken locally has remained entirely unsuccessful.

The lecturer thinks he may draw from the examples sketched above the following deductions:

1. In women, whose recovery is hopeless, tuberculous laryngitis can only be treated by the usual local remedies or by performing tracheotomy.

2. In women whose general health is favorable one may, so long as the affection of the larynx is insignificant (a little redness or a slight ulceration), pursue an expectant plan. So soon as symptoms of infiltration show themselves or the disease extends and becomes diffuse, one should acquaint the patient with the danger of her condition, and after obtaining her consent, should perform tracheotomy as soon as possible; and if this does not act favorably in a few days, should induce premature labour.

The earlier the pregnancy is interrupted so much the more favorable are the chances for the mother, because the strain on the mother is less the smaller the foetus is. Besides, the loss of blood is usually less in a favorable abortion. From the seventh month of pregnancy onwards the prospects for the mother are worse, because complete exhaustion usually follows the strain of parturition.

It is advisable to perform tracheotomy in advanced laryngeal disease before parturition, or at least to hold oneself always in readiness to carry it out, in order to be able to obviate sudden asphyxia during the act of birth.

EDITORIAL.

THE RELATION OF HUMAN AND BOVINE TUBERCULOSIS.

The present agitation of this question has been engendered by Prof. Koch's announcement (which appears in another part of this Journal) to the recent Tuberculosis Congress in London, that the extensive experiments, conducted under his supervision during several years past, showed that cattle and other large domestic animals could not be successfully inoculated with tubercle bacilli from human sources.

The comprehensive investigations of Prof. Koch undoubtedly go far toward the confirmation of results previously obtained by other experimenters, notably Baumgarten in Germany, and Theobald Smith and others in this country.

The question would seem to be settled then, in its immediate bearing upon the transmission of human tuberculosis to cattle, and we may conclude that tuberculous caretakers are not a source of danger to cattle, and that refuse from the tables of consumptives may be fed to these and other large domestic animals without incurring the risk of propagating tuberculous disease amongst them. But this is indeed a matter of minor importance.

The question which is of infinitely greater concern to us, in its far-reaching significance, is that of the danger to man from the ingestion of milk and other food products from animals affected with bovine tuberculosis.

To prove that virulent tubercle bacilli from cattle and swine are non-infectious for man is, in the very nature of the experiments entailed, a most difficult proposition. Elucidation of the question will require much time and patience; for it can be determined only indirectly, by chance observation which can never have the force of direct demonstration. Even if some enthusiast should be willing to jeopardize his health, and perhaps also his life in the interest of science, one or even several such experiments could at best afford but a limited amount of negative evidence, against which would still stand a large number of clinical observations, which form in themselves a chain of circumstantial evidence, amply sufficient to justify us in remaining on our guard.

The writer himself has recorded such a clinical history in this Journal (Vol. I, p. 64) in which to accept another causal relation than

the milk of a tuberculous cow would seemingly do violence to reason. Ernst in his report of investigations made for the Massachusetts Society for Promoting Agriculture, cites a number of cases in which the evidence of infection of man from milk is almost conclusive; and many other instances of like nature are scattered through the medical literature of the last twenty years.

The identity of human and bovine tubercle bacilli in their morphological and cultural properties, the susceptibility of guinea pigs and rabbits to successful inoculation with either form, as well as the histological identity of certain forms of miliary tuberculous processes in both man and cattle, tend to the negation of the proposition that tuberculosis cannot be transmitted from the bovine to the human species.

On the other hand the strongest evidence that we have thus far that man cannot be infected by bovine tubercle bacilli, is embodied in a paper by Prof. Baumgarten, a translation of which is given in the current number of this Journal, and which assuredly is of such a nature as to inspire the hope that the opinion expressed by Koch is, on the whole, the correct one.

The ineffective inoculation by Rokitansky of a number of patients who were suffering from inoperable malignant disease, with tubercle bacilli from a bovine source, and the macroscopical and microscopical examinations made, post-mortem, by so competent an observer as Baumgarten, with negative results, can be subjected to criticism in but few respects. At that time the science and technique of bacteriology were not developed to the degree of exactness which obtains at the present day, and sources of error were not then recognized and avoided as they have been in more recent years. If, however, these experiments were made in as reliable a manner as they could be made now, the fact still remains that the number of instances was too small, since not all individuals are susceptible to infection, the majority of those exposed in the ordinary manner, escaping the disease. In our opinion it would require the inoculation of a large number of persons—such persons as could be considered to be constitutionally predisposed, and more particularly of young children, to establish as a certainty that bovine tuberculosis cannot be transmitted to man.

That in many, if not in the majority of instances, the outbreak of

tuberculous disease is not the result of recent infection, most clinicians agree. That the infection often dates back to a very early period appears extremely probable if we study the history of patients from their childhood, and if we note that such individuals have frequently failed in physical development as compared with other members of the same family, or have shown evidences of scrofula in earlier years. Therefore, because several adults failed to become infected by tubercle bacilli from cattle, it is by no means proven that they would likewise have escaped in their infancy, when the degree of resistance would undoubtedly have been less.

The chief reason upon which Prof. Koch bases his hope that bovine tuberculosis is innocuous for man, viz., that primary tuberculous lesions of the intestine are of relatively rare occurrence, must also be questioned, particularly because this fact argues against infection by human tubercle bacilli as well.

It must be admitted that even secondary infection of the intestinal mucosa is infrequent in instances in which infectious material must indubitably have reached the bowel almost daily for long periods of time. The writer has reference to phthisical patients, who for years had countless numbers of tubercle bacilli in their expectoration, and in whom, as found on autopsy, the bowel had remained free from tuberculous disease, a fact which, at first thought, would tend to show the comparative freedom from danger from milk containing tubercle bacilli.

Even in young children, who actually swallow their sputum, and in those adults who practice this habit, we usually find no signs of intestinal lesion after death. Actual tuberculous disease of the intestine occurs in such cases most frequently toward the closing stages of the disease, at a time when the intestine has become the seat of catarrhal inflammations, the result of fermentative processes coincident with the failure of the digestive organs in their functional activity.

That in certain abnormal conditions the intestinal mucous membrane may afford passage to tubercle bacilli, into adjacent lymph glands, or even into the thoracic duct, and thence into the blood, seems, however, not only theoretically probable, but has been shown to happen. Cornet, for instance, quotes Fischer on such occurrences, and has himself demonstrated that mucous membranes (nasal, genital, conjunctival)

inoculated by gently rubbing tubercle bacilli into the tissues, may remain normal, while the nearest lymph glands become the seat of tuberculous disease.

Since this is true of the nasal, genital and conjunctival mucous membranes, there is no reason to believe that it may not be equally true of other mucuous membranes. By the peristaltic action of the bowels, especially of the colon in the presence of solid faecal matter, conditions obtain, similar to those induced by Cornet. In cases in which, after death, the mesenteric glands are found to be tuberculous, while no lesion of the intestinal mucosa is demonstrable, we are justified in assuming that the bacillus has penetrated the intestinal wall and has lodged and developed in the lymphatic glands, without having left any trace in passing. Once the infection of the mesenteric glands has occurred, conveyance of the germs to more distant organs and structures by the lymph stream may readily ensue. Such infection is much more liable to occur in childhood, inasmuch as greater permeability is shown to exist in children, owing, probably, to the greater activity of the lymphatic system in early life, which at this period is characterized by proportionately larger lymphatics and lymph spaces. Furthermore, children are especially prone to functional disturbances and inflammatory processes of the digestive tract. The numerous cases of *tabes mesenterica* in which, post-mortem, no lesions of the intestinal mucosa or of other structures could be found, would support the theory that such a mode of entry is indeed the only one possible to the mesenteric glands. The frequent occurrence of tuberculous cervical adenitis in which, after death, no lesions are elsewhere demonstrable would also go to show that the nasal and oral mucous membranes have allowed the bacillus to pass without the establishment of lesions at the point of entry. Tuberculous affections of the bronchial glands have also been found in many instances in which no trace of tuberculosis of the respiratory tract, or of other organs, could, on autopsy, be observed.

The number of pathogenic germs taken into the body at one time may logically be considered as an element in infection. Prof. Virchow, in his address to the Medical Society of Berlin (a translation of which appears in another part of this Journal) expresses the opinion

that so long as but a few gain entrance at a given time, the danger is not great.

In summing up the evidence, pro and con, whether it is a question of absolute insusceptibility of man to the bacillus of perle disease, or of relative resistance of mucous membranes, or again, of the number of germs taken in, or finally of adaptation of the bacillus to a particular soil, etc., the fact remains that these propositions, one and all, require determination by future and more extensive investigations.

We ardently hope that the transmission of tuberculosis from cattle to man may eventually be proved beyond the shadow of a doubt, to be absolutely and unconditionally impossible. In the meanwhile, until the relation of the two diseases, whatever it may be, has been clearly and decisively established, we cannot but earnestly advocate the continuance of all the measures now in force for the prevention of tuberculous infection from animals to man.

SUPPLEMENT TO THE JOURNAL OF TUBERCULOSIS.

In this part the whole subject of Pulmonary Tuberculosis will be covered by a continued series of articles written by Dr. Karl von Ruck to appear in the following order :

Article I.—The Cause of Tuberculosis, and The Conditions Which Predispose to its Acquirement. Article II.—The Prevention of Tuberculosis. Article III.—The Pathology and Symptomatology of Pulmonary Tuberculosis. Article IV.—The Diagnosis of Pulmonary Tuberculosis. Article V.—The Prognosis of Pulmonary Tuberculosis. Article VI.—The Treatment of Tuberculosis, Dietetic, Hygienic and Symptomatic. Article VII.—The Climatic Treatment. Article VIII.—The Specific Treatment. Article IX.—Laryngeal Tuberculosis, its Diagnosis and Treatment. Article X.—Institutions for the Treatment of Pulmonary Tuberculosis.

THE TREATMENT OF TUBERCULOSIS.

[CONTINUED FROM PAGE 313.]

Eskay's Albumenized Food represents, as will be seen from the following analysis, a whole food into which fats, proteids and carbohydrates enter in proper proportion. The fats as well as the proteids are almost entirely vegetable, with a small percentage of each derived from eggs. Excepting the egg, fat and albumen, the preparation is produced from wheat, oats and barley, and while no proteolytic ferments are used in its manufacture, the insoluble carbohydrates are nevertheless partially converted into dextrin by a special process of heating, which ruptures the starch granules and converts a small amount of the starch. The analysis of the dry food is:—

Fat.....	2.35 per cent.
Proteids.....	9.88 per cent.
Soluble carbohydrates, mainly milk sugar.....	53.73 per cent.
Insoluble carbohydrates, mainly starch.....	29.30 per cent.
Ash.....	1.16 per cent.
Moisture.....	3.10 per cent.

One hundred grammes of this food represent about 400 calories which, if I am rightly informed of the retail price, cost the consumer about 20 cents.

To this list of non-digested food preparations, I might add indefinitely;—those here given serve to illustrate my purpose of showing their source, composition, food value and relative cost, and the readiness with which one can arrive at this information when a proper analysis is at hand.

From the even larger number of partially or completely digested preparations from beef, I append the following:—

Mosquera's Beef Meal. This is a partially digested beef preparation, containing in addition to the proteids, 13.06 per cent. of fat.

The analysis is:—

Water.....	6.68
Salts and inorganic substances.....	4.20
Fats.....	13.06
Insoluble proteids.....	47.61
Albumose.....	29.43

Taking the insoluble proteids, albumose, and fats together, 100 grammes are equal to 435 calories, while the albumose alone represents 122 calories with a cost to the consumer of about 30 cents.

Mosquera's Beef Jelly contains 12.66 per cent. of albumose and 14.35 per cent. meat extractives. It represents therefore the stimulant as well as the nutrient qualities of beef.

A two ounce jar retailing at 50 cents is equal to 34 calories from the albumose, and if we were to take the meat extractives at the same ratio, the total number of calories would be 94.

Armour's Soluble Beef is a pure beef preparation containing 0.5 per cent. of fats, and at least 35 per cent. of proteids which are present in the form of albumose. An analysis recently made by the London Lancet showed 54 per cent. The manufacturers claim:—

Moisture.....	27.5
Fat....	0.5
Proteids (albumose).....	35.0
Other nitrogenous extractives (from meat extracts).....	15.0
Non-nitrogenous extractives.....	8.7
Ash.....	13.3

The preparation is very palatable, non-irritant and staple. Including the extractives and the fat, a two-ounce package is equal to 155 calories, (the albumoses alone give 93 calories) with a cost to the consumer of 50 cents.

Somatose. This completely predigested beef preparation contains 80 per cent. of albumose with only a trace of true peptone, and is the only one with which I am acquainted that carries so high a percentage of converted albumen in the most acceptable form.

It is practically odorless and tasteless, permitting its addition to all

kinds of fluids and foods without offending the palate. A two ounce package retailing for \$1.00 contains 49.6 grammes of albumose, equal to 208 calories.

Of predigested beef preparations which in addition to proteids contain also carbohydrates or carbohydrates and fats, I may give as examples the following:—

Panopepton represents the products of the peptic digestion of fresh, lean beef, and of the proteolytic and amylolytic digestion of whole wheat; proteids in the form of albumose and peptone, carbohydrates as achroo-dextrins and maltose, and the natively associated soluble, savory and stimulant mineral constituents. These soluble food constituents are sterilized, concentrated and, after being duly proportioned, are redissolved in sherry wine.

Panopepton contains 20 per cent. of solids as follows:—

Soluble proteids.....	6 per cent.
Carbohydrates.....	13 per cent.
Ash.....	1 per cent.

It will be noted that the ratio of proteids and carbohydrates is as 1 to 2.16, which is best calculated for a proper nutritive balance.

This is undoubtedly one of the best predigested foods of the class that contains both proteids and carbohydrates in their most available forms and, from the data supplied by its manufacturers, it is evident that it is designed upon scientific principles to represent the varied constituents of a mixed diet, and that its preparation is carried out in a most perfect manner in all respects. The wine serves both as a stimulant and preservative, and the product has an agreeable taste and flavor.

Panopepton is sold in 12 oz. bottles which retail at \$1.00. One hundred grammes (about 3 1-3 oz.) equal 77.5 calories, which cost the consumer about 26 cents.

Trophonine belongs to the class of partially converted whole foods which contain proteids, fats and carbohydrates. The analysis supplied is as follows:—

Moisture...	85.29
Fats.....	0.99
Proteids; coagulable....	0.38
Peptone....	1.11
Carbohydrates (Maltose and dextrin)...	11.43
Salt extractives... . .	0.28
Ash...	0.52

The preparation in 10 oz. bottles retails at \$1.00. One hundred grammes (about 3 1-3 oz.) contain from fats about 9 calories, from

proteids about 6 and from carbohydrates about 47, making a total of approximately 62 calories which cost the consumer 33 cents.

Horlick's Malted Milk:—Of partially converted foods which supply all nutritive substances I have found Horlick's malted milk to answer an excellent purpose at a minimum cost. In this preparation malted barley and wheat are combined with pasteurized milk, the casein of which is partially digested.

The analysis shows it to contain:—

Albuminoids..	21.35 per cent.
Fat...	8.75 per cent.
Maltose and Lactose.. . . .	46.09 per cent.
Dextrin..	18.82 per cent.
Ash	3.14 per cent.
Water...	2.10 per cent.

Great care as to cleanliness and perfection of the milk supply is a special feature carried out by the manufacturers and the preparation is one of undoubted merit. It is a well balanced food, containing albumen, fats and carbohydrates in proper ratio, which make it a valuable preparation not only for the feeding of infants, but for adults and invalids as well. Many years of use of malted milk in the Winyah Sanatorium has been satisfactory to a degree that it has become indispensable as a substitute for milk, and as an addition to other forms of diet. In gastro-intestinal complications its digestibility and toleration are especially evident. A calculation of the calories contained in 100 grammes (3 1-3 oz.) shows an exceptionally large food value, there being over 435 calories at a cost to the consumer of 20 cents, and in a form which demands but a small degree of digestive power and with little, if any loss in its final conversion.

MALT PREPARATIONS.

A most important group of preparations, rich in carbohydrates, are supplied by malt extracts, and the preparations upon the market are quite numerous. In their employment we should distinguish between two groups, one representing the extract in a concentrated form like Maltine, or Trommer's Extract of Malt, the other in a dilute form like Johann Hoff's.

The concentrated forms in addition to their nutritive properties, possess also marked diastatic power which make them particularly valuable in the dietetics of disease.

The dilute forms have chiefly a nutritive value in proportion to the percentage of extract they contain, some of them carry a considerable amount of alcohol, thereby acting as stimulants, like rich, dark beer.

In considering the concentrated extracts, we may take as the standard one of the most perfect preparations.

Maltine:—As this product possesses the greatest attainable degree of diastatic power which is preserved in its manufacture by concentration in vacuo at a low temperature, and since it is derived from a combination of wheat, oats and barley, the amount of nitrogenous constituents is necessarily greater than in other extracts which are made from barley alone:—

The analysis of Maltine is as follows:—

Proteids.....	5.62 per cent.
Maltose.....	62.30 per cent.
Dextrin.....	4.65 per cent.
Salts.....	1.40 per cent.
Phosphoric acid.....	0.36 per cent.

Its power to convert starch (one part of Maltine completely converts 20 parts of starch in an hour) makes its administration especially desirable in cases where the intestinal digestion is impaired from any cause.

As to its food value, 100 grammes are equal to 23.5 calories from proteids and 275 calories from carbohydrates, making a total of nearly 300 calories. A bottle holding 16 fluid ounces weighs a little over 22 ounces avoirdupois or about 680 grammes, the 300 calories in 3 1-3 ounces by weight, costing the consumer about 15 cents.

Personally I have found Maltine a most valuable food as well as digestive aid in my efforts to increase the nutrition of phthisical patients; especially when an increase of carbohydrates was not attainable with ordinary food; if fat in the form of codliver oil is also desired, as is often the case, in order to secure a satisfactory increase in weight, Maltine and Codliver Oil makes a happy combination, since it is a good emulsion with the taste of codliver oil well disguised.

Trommer's Extract of Malt is, one of the oldest if not the oldest preparation of the concentrated forms. Its analysis is as follows:—

Proteids.....	3.11 per cent.
Maltose.....	51.03 per cent.
Dextrin.....	10.94 per cent.
Glycerine.....	9.27 per cent.
Free acid (calculated as lactic)	0.53 per cent.
Alcohol.....	1.59 per cent.
Inorganic substances.....	1.16 per cent.
Water.....	22.47 per cent.

The proteids and carbohydrates show a food value of about 13 calories for proteids and 260 calories for carbohydrates in every 100 grammes, costing the consumer for the 273 grammes about 15 cents.

Of the dilute malt extracts there are a large number which in recent years have been brought to the attention of the profession. They all contain more or less alcohol, some like Wampole's and Schlitz's preparations over 6 per cent. others like Johann Hoff's and Wyeth's about 3 per cent. while Malt Nutrine contains less than 2 per cent.

The amount of malt extract also varies greatly, Johann Hoff's preparation claiming 15.26 per cent., Malt Nutrine, 15.50 per cent. and Wyeth's, 15.08 per cent.

All serve as nutrient tonics and are more or less stimulative according to the amount of alcohol present; I frequently prescribe them, to be taken with meals, and as a rule with benefit to my patients as aids to their general nutrition.

Johann Hoff's Extract, Wyeth's Extract and Malt Nutrine are undoubtedly among the best malt preparations in the market. The analyses supplied of Johann Hoff's preparation and of Malt Nutrine are as follows:—

Analysis of Johann Hoff's Malt Extract:—

Carbonic Acid.....	0.07 per cent.
Alcohol... ..	3.56 per cent.
Extract....	15.26 per cent.
Albumen... ..	0.29 per cent.
Mineral Substances... ..	0.35 per cent.
Maltose.....	2.40 per cent.
Dextrin.. ..	7.85 per cent.
Lactic Acid... ..	0.23 per cent.
Acetic Acid... ..	0.12 per cent.
Water.. ..	69.84 per cent.

This preparation is also supplied in combination with peptonates and manganate of iron, and when anaemia is present it serves an excellent purpose as a nutrient stimulant, and it is pleasant to take as well.

Analysis of Malt Nutrine:—

Extract by weight... ..	14.60 per cent.
Extract by volume... ..	15.50 per cent.
Alcohol by weight.....	1.90 per cent.
Maltose by weight	8.50 per cent.
Albuminoids by weight ...	0.82 per cent.

I have previously stated that the use of foods especially prepared for high potential values, digestibility, or ease of assimilation is not required, so long as the patient is still in a good physical condition, has a good appetite and digestion and is practically free from fever.

When a patient comes under treatment who is fortunate

enough to bring to his resources these conditions which so decidedly influence the course of the disease in a favorable manner, our constant attention should be given to their preservation by so adjusting and controlling the ordinary diet and by avoiding injurious medication through the stomach, that the digestive organs will suffer no impairment in the future.

THE SYMPTOMATIC TREATMENT.

Patients who seek professional aid because of their lung affection have, as a rule, more or less symptoms from which they desire relief at our hands, and they are apt to measure the result of our professional skill and care by their amelioration and disappearance. If the cough improves or stops entirely, if the appetite increases and weight is gained, if night-sweats grow less or cease entirely, if there are no more chills or if these become slight and occur less frequently, the patient believes that he is being benefited by our treatment; and rightly so, at least in most instances. Such an attitude of our patients, and the desire on our part to justify our procedures in their judgment, may, however, lead to methods of practice which are not only without value, but may interfere with the patient's best interests.

For this and other reasons, especially that of convenience and ease of administration, the employment of coal-tar antipyretics for fever, opiates for cough, atropine for night sweats, morphine for pain, hypnotics to induce sleep, whiskey for general stimulation, excessive feeding for the purpose of forcing an increase of weight, etc., become too often a matter of routine practice to the neglect of other and safer means which, with patience and thoughtful application, would accomplish the same end and contribute to real and lasting improvement. Although the effect from the better methods is not always as prompt, most patients will appreciate their adoption, if we point out our reasons and explain to them that the symptoms for which they seek relief are dependent upon a cause, which cannot be removed by simple suppression of symptoms through the use of drugs.

The direct treatment of symptoms has for its usual object their moderation or removal in so far only, as their degree or presence becomes a source of danger or a hindrance to the removal of the cause by preventing or retarding general and local improvement, and in so far as they interfere with the patient's comfort. Their final control depends upon the arrestment of and recovery from the disease itself, of which they are the outward manifestations.

In prescribing for such symptoms the incidental effect of the remedy employed must always be reckoned with, and often we are

confronted with a choice between two evils, of which the contemplated remedy may not be the least.

THE TREATMENT OF FEVER.

By referring the reader to the section of pathology and symptomatology, (1) in which I have endeavored to describe the different forms of fever and to explain its probable cause, I am saved a great deal of repetition. I have there considered chiefly three types of fever, namely one form which we observe with the purely tuberculous invasion of the tissues, a second form which occurs with caseation and tissue disintegration, and a third form which results from acute, inflammatory complications. In the primary eruption of tubercles in the lung and with the chronic, slow extension of the tuberculous process there is often no fever at all; when present it is never very high. This form of fever is, as a rule, not attended by chill or chilly sensations and most patients soon become accustomed to it. It may, however, be the cause of diminished appetite and indirectly of loss of weight and should therefore have careful attention. Since this form of pyrexia rarely exceeds 100.5 degrees F. and is usually of short duration, absolute rest in bed is not required, but rest out of doors, and limitation of exercise during afebrile periods is necessary. Out-of-door life in this stage should be taken advantage of, not only at climatic resorts, but wherever the patient may be. As far as the state of weather permits, the patient must be at rest, at least an hour before the fever begins, upon a cot or especially adapted reclining chair in the open air, and no exercise is to be taken until the temperature has fallen to 99 degrees F. or below.

If rest out of doors, and in adverse weather in a well ventilated room, is persisted in, if the diet is suitable and other factors in the general management are correct, this fever will usually subside without additional interference.

The milder forms of hectic fever are amenable to the same methods of treatment, by rest and fresh air. Severer types often begin with a chill, or chilly sensation and the maxima reach higher degrees; in such cases absolute rest in bed for an hour or more preceding the chill and thereafter until the chill has subsided, is necessary. If the chill is severe, special precautions are required for its prevention or moderation. Chill is often one of the most distressing symptoms and patients dread it much more than they do fever. With painstaking care these rigors can be kept in abeyance or may at least be gradually moderated, and if it were but for the increased comfort to the patient, all efforts to this end would be well repaid. If, however, the rigor is severe the subsequent

(1) Journal of Tuberculosis, Vol. II., p. 94.

fever is very apt to be equally so, and, as a rule, the maximum is one or two degrees in excess, and the duration of the fever is longer than in those instances in which we succeed in preventing the chill. If the chill occurs in the forenoon, as is usual, the patient should not leave his bed; at any rate he should be comfortably warm and well covered for at least an hour before the time when the chill appeared on preceding days. During this time I allow no cold drinks, nor the washing of the face and hands with cold water; the room must be well heated in the winter, and every opportunity for chilling must be scrupulously avoided. If the feet are not warm, a hot water bag or a bottle of hot water should be placed to them and a hot drink—lemonade, coffee, milk, or very hot water—is given half an hour before the chill is expected; this is to be repeated in 15 to 20 minutes unless the patient feels thoroughly warm, and no change or exposure that can in any way chill the patient's surface should be made until the temperature has begun to rise and has reached over 100 degrees F.

It will be found that in most instances, the chill, if not entirely prevented will be moderated, or will be delayed for some time and then occur in a less severe degree. Such a result may be all that can be accomplished the first day, but by persisting further, amelioration will follow with succeeding days.

If chill or chilly sensations persist after a week of such treatment, then instead of simple hot drinks, hot stimulants should be used. A glass of spiced wine or a hot lemonade with $\frac{1}{2}$ ounce or 1 ounce of whiskey and repeated in half an hour may succeed; this failing also, in addition to the other precautions, 10 grains of quinine and if necessary an increased dose should be given every two hours before the chill is expected. As the quinine is likely to interfere with the digestion the dose should be reduced or omitted as soon as possible, and in patients whose stomachs are already deranged or irritable, twice the quantity mentioned, in the form of a bisulphate or hydrochlorate in solution, should be administered per rectum three hours in advance of the anticipated chill. If this cannot be done, ten grains of the bisulphate dissolved in thirty minims of warm, sterile water should be given hypodermically.

By far the most satisfactory and most beneficial method of treatment of fever is the use of cold water, and, whenever the condition of the patient permits its proper and systematic application, it deserves preference over all other methods.

As unsuitable cases, in which the cold applications may even prove detrimental, I must mention those who are greatly exhausted; then warm water with facilities for ready evaporation may be used instead. Excluding such cases, the treatment with cold water is properly restricted

to patients who by reason of their physical condition and the stage of their disease justify the expectation of material and lasting improvement and recovery. When, in such patients, the fever reaches 102 degrees F. or over, and is not readily controllable by rest, diet and fresh air, the cold applications should be tried. In general they should not be made until the temperature has risen above 100 degrees F., and when the rise occurs with chill the methods, heretofore mentioned for the control of the latter, must be still employed before the fever receives attention. Only after the temperature is equalized and the extremities are warm, should cold water applications be made; in milder degrees of fever they may be made in the form of cold sponging, while for higher fever, cold compresses or the cold pack are required.

In either case it is well to initiate the treatment with the cold sponging, using the water a little colder at each repetition which should be every 20 or 30 minutes; this accustoms the patient gradually to lower degrees of temperature and prevents chilling and general discomfort. No immediate effect must be expected, especially with a rising temperature, and if after several days the maximum of the previous days has been lessened by from a half to one degree, or if the fever declines earlier the result should be considered satisfactory.

The frequency of repetition must be determined in the individual case. The stronger and better nourished the patient is, the better, as a rule, will he tolerate cold applications. If sponging is found insufficient, cold compresses should be substituted; they are made by wringing out of cold water (and if easily borne, eventually out of water cooled with ice) three or four thicknesses of bath towelling and applying them to the anterior and lateral parts of the chest and abdomen, from chin to pubis. A piece of flannel, wide enough to cover the compress in front, is placed under the patient. The compresses as well as the pack presently to be mentioned, are changed every half hour according to the strength of the patient and the effect produced.

The pack is applied to the back and front in like manner and a rubber sheet should be placed over the flannel. If needed it may extend to and include the lower extremities. The resulting effect determines the degree of cooling of the water, but chilling of the patient must be avoided; as the temperature declines the changes are made less frequently and when 99 degrees F. is reached the patient receives an alcohol rub and the treatment is, for that day, discontinued.

It will be found that the reduction of the temperature does not depend entirely upon the degree of cold applied, but that evaporation can also be taken advantage of for the same purpose. If we are obliged to depend upon the latter, in part or entirely, because cold

water is not well borne by the patient, the water may be as warm as necessary, but then, only a single thickness of bath towelling or several thicknesses of cheese cloth should be used and the patient should be covered with merely a light flannel sheet, in order that evaporation may progress more rapidly.

In many cases the effect, while prompt and satisfactory as to the reduction of fever, will be lost if the treatment is discontinued too early, but if the patient's general condition shows improvement the treatment should be persisted in for weeks and months as one of the important aids in conserving the patient's resources and which will enable him to pass through the pathological changes, and arrive at a period where the cause of the fever has disappeared.

The fever which occurs with acute incidental inflammation such as pneumonia or acute pleurisy, has a continued type and the diagnosis of its occurrence can often be made from the temperature chart.

The temperature continues to rise higher and recedes but little, at a time when before it showed a return to the normal. The attending subjective symptoms and physical examination of the chest will usually enable us to determine whether we have to deal with a pneumonia or pleurisy or possibly with both; but I have repeatedly seen cases in which there was no increase or change in symptoms beyond the fever, and in which the physical examination left me in doubt, at times only for a few days, at other times entirely, particularly with patients who had extensive catarrhal râles and in whom a small pneumonic focus, or a deep-seated one, was liable to be obscured by their presence.

With the beginning of such fever the patient must be put to bed and when I am reasonably sure of, or strongly suspect a pneumonia, I give at once a full antipyretic dose of quinine; at the same time I order a hot poultice over the involved area of the lung, or over that part of the chest which I suspect is the seat of the trouble. With evident pleurisy I use counter-irritation by adding mustard to the poultice, and if the pain is severe I resort to strapping, or give one-eighth to one-fourth grain of morphia hypodermically. I have found that with such complications cold water or the application of an ice bag is not well borne; especially when the patient is much reduced. The quinine, however, often exerts a decided influence upon inflammatory complications if it is given within ten or twelve hours from the onset, and in some instances it appears to abort the entire process.

Within the last year or two I have had opportunity to make a trial of kresotal in large and frequent doses for a like purpose in exudative pneumonias, and while my experience is still very limited,

with the few cases that I have treated, it appeared to act so satisfactorily that I shall resort to it again in the future.

The instances in which I feel warranted in using any of the modern coal-tar antipyretics, and then only in fractional doses, are in the presence of temperatures exceeding 103 degrees F., when occurring with inflammatory complications, providing that the circulation does not contraindicate their use. The antipyretic is then but a temporary expedient, and not a matter of daily repetition.

Another class in which I have seen decided benefit from antipyretics is lighter, febrile cases in which the elevated temperature, corresponding with the usual hour for a meal, takes away the patient's appetite. When in such cases there is a good circulation and when rest and fresh air do not speedily bring relief, I give a small dose of thermol (one to one and a half gr. is enough), an hour before the meal; if it restores the appetite, which it almost always does, I repeat it daily until the fever is otherwise controlled.

With these exceptions I cannot but advise against the use of this class of antipyretics, no matter under what name they may be offered. It is much better to submit to a little more fever for such time as with the existing pathological changes, it must necessarily be present, than to take the risk of causing serious damage to the heart, upon the integrity and power of which, as we have seen in the consideration of rest and exercise, depends so greatly the ultimate result.

When the coal-tar preparations first came prominently before the profession, the prospect of keeping our phthisical patients practically free from fever during the active and progressive period of the disease seemed very alluring; knowing little of the attending danger many physicians who then resorted to their use, have since testified against the practice. I still remember my first dose of antipyrin of 10 grains, that I gave to a patient who had hectic fever which promptly declined with profuse perspiration to the normal, and then became subnormal, the patient's condition almost approaching that of collapse. This state was followed by a severe and prolonged chill, the temperature rose quickly to a higher degree than it had reached on previous days, and the general condition on the following day was decidedly worse from this interference. It is much the same with all other preparations which I have tried since. They all reduce the temperature for a short time, and then it rises again, usually higher than before, unless the antipyretic is repeated or is given after the maximum temperature has been reached, when the fever naturally declines. Frequently repeated smaller doses prove less harmful, but they are also less effective; in either case, after some weeks of such treatment, or sooner, the heart action begins to show increased

frequency and weakness and the anaemia becomes more pronounced, the appetite grows less, and the stomach digestion suffers more, than in patients to whom these antipyretics are not given.

Of the antipyretics which in the treatment of phthisis claim most attention at present are thermol and piramidon. The former, an American product, has been highly endorsed in this country, especially in La Grippe, as frequently aborting the disease or rendering its course mild and less distressing, thus preventing serious complications, especially pneumonia.

As it is nevertheless a coal-tar product, I should hesitate for a long time to employ it in full enough doses to keep a patient afebrile in the hectic or inflammatory fever of phthisis, although as a temporary measure in high fever and as a means of lowering slighter febrile elevations which coincide with meals, I have every reason to be satisfied with it.

If it is, however, as valuable in La Grippe as numerous observers have found it to be, it is nevertheless of more particular interest to the phthisiotherapist, since this disease is directly or indirectly responsible for the actual outbreak of phthisis, in a vast number, if not in the majority of cases, through coincident inflammatory processes in the lungs, by which latent tuberculous processes are brought into activity by the initiation of softening and destructive changes. In over half of my clinical histories of the last ten years the patients dated the beginning of their illness back to an attack of influenza and it appears more than probable that in many instances the existing latent tuberculous process would have remained latent, and that the patient would have continued in the enjoyment of good health, had the attack been aborted or had it followed a mild course. In other instances, a reversal from a favorable course of improvement during treatment, relapses in the arrested disease, or relapses of supposedly cured patients can, with all justice, be charged to this affection. Since this is the case, its successful treatment has a great bearing on the prevention of the outbreak of phthisis, and if thermol or any other antipyretic can accomplish what is claimed for it, its more general use in influenza should be followed by a corresponding reduction in the number of cases of consumption which seems to increase and diminish with the occurrence and decline of influenza epidemics.

For several years past pyramidon, which is an antipyrin derivative, has received favorable mention, and is now preferred to other coal-tar preparations by many German physicians who, in their treatment of phthisis, would consider an antipyretic at all. Pollack (1) has reported

(1) Wien. Klinisch. Wochenschr., Jan. 18, 1900.

very satisfactory results from doses of four grains and less, and recommends it especially in instances where the fever interferes with the appetite, and in which much smaller doses of the American preparation, thermol, have proved very valuable in my own hands.

The attempt to prevent the fever altogether, by administering antipyrin, lactophenin or whatever substitute, an hour or more before the expected fever, and to repeat the dose later while the temperature is still normal or is just beginning to rise is a dangerous practice and proves a failure as far as the patient's comfort or recovery are concerned. Even if we succeed in keeping the temperature normal for the entire day, the fever will make its appearance at night, requiring thus, three to six full doses, or many more smaller ones, in 24 hours. In this connection the saying of some physician, that after he began to treat his phthical patients with antipyrin they never had any more fever and that in the end they died free from fever, should not be forgotten.

One of the few recent writers who advocates this kind of practice is Knopf, who, in his article in the Twentieth Century Practice, says he finds the practice a good one to follow; instead of antipyrin, as recommended by Darenberg some years ago, he recommends 10 grain doses of lactophenin, to be repeated if necessary. While I agree with Dr. Knopf in most other essentials in the treatment of fever, I fear that lactophenin will prove no exception to the rule, and that with further investigation Dr. Knopf will find occasion to discontinue its use.

Of other methods to moderate or control the fever I should perhaps mention the use of guaiacol either by inunction or hypodermically, Crede's silver ointment, and also the antistreptococcic serum for cases of mixed infection. In my trials of these methods, I have seen decided reduction of the temperature from inunction of guaiacol, but with no better results than from coal-tar products. The inunctions produced quite varying effects upon different days of application, depending no doubt on the varying amounts absorbed. While showing but little or moderate influence at one time, a like quantity rubbed into the skin on another occasion, with the same care and at the same hour of the day, caused collapse in one of my cases, which yielded only to several hypodermic injections of ether, and caused my assistant and myself much anxiety and alarm. Subsequently I gave the guaiacol hypodermically, undiluted, and found that the effect could thus be better controlled. The injections are not painful if the needle is free from guaiacol and if none is allowed to flow back through the puncture on withdrawing the needle. After numerous trials I found no advantage, the patients' improvement was not enhanced, neither was their

comfort; for quite often the depressed temperature rose with chill to higher degrees, than on days when the treatment was omitted (for comparison) and decided reductions of the fever were invariably accompanied by profuse perspiration.

I have also made numerous trials of Crede's silver ointment and in some cases have continued its application for from two to six weeks. I selected cases of hectic fever with chill of a severe type, others of a milder form and without chills and a few early stage cases whose temperature did not exceed 100 degrees F. I regret to say that in none of my patients was there any reason to believe that the ointment influenced the fever in any way whatever.

My experience with antistreptococcic serum was no better; on the contrary I have noted a very sharp rise with chill to follow its injection in several patients who, before its use and after its discontinuance, had no chills whatever; the fever and chill appeared within four hours after the injection. Only in one instance was a material change for the better apparent, but this change also coincided with the evacuation of a cavity, and it seemed more reasonable to attribute the relief to this than to the serum.

THE TREATMENT OF COUGH.

Cough which appears in the course of phthisis requires interference only when it is in excess of its useful purpose for the outward discharge of bronchial or cavernous secretions, and when, under such circumstances, it becomes a source of injury or at least of discomfort to the patient.

In the period of tubercle formation there is, in the average patient, but little cough, and before the open stage is reached, during which secretions from ulcerated surfaces or cavities enter the bronchi, there may be no cough at all.

If more severe cough exists at such periods it is usually the result of intercurrent bronchitis from cold and exposure, or of an attack of grippe. The latter disappears under appropriate treatment, and does not differ from similar attacks which occur in the absence of tuberculosis. However, it is of greater importance to control the affection as quickly as possible, so that the bronchial inflammation may be limited to the tubes of large calibre, and so that deeper extension, with the dangers of ensuing inflammation and softening in tuberculous areas, may be prevented.

Since cough is the most prominent symptom of all forms and degrees of bronchitis, its advent or its decided increase in the early stage of pulmonary tuberculosis must have our prompt attention. If

a cold has not been aborted while limited to the nose and pharynx the tuberculous subject should be confined to bed, counter-irritation should be applied over the chest and, according to the severity and stage of the acute attack, sedatives or stimulant expectorants should be administered. In most instances rest in bed with a large flaxseed and mustard poultice over the anterior upper half of the chest will give prompt relief, and additional medication, beyond perhaps the use of demulcent drinks (flaxseed) may not be required. When an acute cold begins with coryza and the patient is seen before the inflammation has extended to the bronchi, an effort should be made to arrest the process by treating the inflammation in the nose and naso-pharynx; for this purpose the following spray solution will be found useful:—Cocaine (alkaloid), oil of cloves, of each one part; menthol, camphor, of each four parts, albolene, sixty parts. The immediate smarting and burning sensation which follows this spray passes away in five or ten minutes. If it is found too severe more albolene may of course be added. Instead of the above the following solution may be used with a nebulizer:—Oil of eucalyptus, oil of cassia, creasote, oil of tar, of each three parts; albolene, eighty-eight parts. This, however, is liable to cause much irritation and discomfort, and may have to be discontinued on this account.

While cough is useful as a means of effecting the outward discharge of secretions, its severity and frequency may seriously disturb the patient's nutrition, by inducing vomiting, by making excessive demands upon his strength and by causing loss of necessary rest and sleep. In addition thereto arises the disadvantage of local and general pulmonary congestion, with possible occurrence of haemorrhage or of pneumothorax, and indirectly of emphysema. When there is abundant sputum there is the further danger of its aspiration into the finer bronchioles which may give rise to exudative pneumonia, to dissemination of the tuberculous process, or to both. When such conditions are induced they become in themselves etiological factors in the maintenance and increase of the cough. That "cough begets cough" is an old saying among experienced phthisio-therapists.

Since cough is, as a rule, increased by exercise, by prolonged talking, by inhalation of irritants (especially of dust), by mouth breathing of air at low temperature, and by external chilling, our first duty is to so regulate the patient's conduct and environment that these causes may be excluded. I have frequently pointed out, on other occasions, that when the general care and management of the patient are correct, the occasions for the adoption of direct methods of treatment of cough are comparatively infrequent. This will be found the more true if we also

demand that our patients make as great an effort as possible to resist the first impulse to cough or to clear their throats.

Many patients cough violently and expend far more physical force than is necessary to expectorate the secretions which are ready to come up. Others who labor under the erroneous impression that they must cough up the last remnant of expectoration which they are able to force out, fatigue and tend to exhaust themselves unnecessarily. A little instruction in these respects is often very helpful, especially when the secretions seem difficult to dislodge.

In this regard my rules for patients are as follows :—

1. Report promptly if you think you have taken a cold.

Prevent irritation of your lungs and air passages by avoiding dusty and badly ventilated rooms, keep off from dusty streets. Don't smoke. Avoid fatigue from overexertion. Do not talk much if it makes your voice husky or increases your cough. Breathe through your nose at all times, but especially when the air is cold. Don't talk when taking physical exercise. Avoid chilling by wearing proper clothing and have extra wraps when needed.

2. Cough is only useful for the purpose of expectorating. Make determined efforts to resist the impulse at all other times. Dry cough is injurious, it is subject to self discipline, and can usually be avoided by resisting the first impulse, when the irritation will quickly disappear. If necessary hold your breath for a few seconds or, this failing take a few deep inspirations through the nose; if the air is cold, warm it by holding a handkerchief before the mouth. Take a drink of cold or of hot water, or if troubled frequently, carry lozenges of Iceland moss or of licorice and let one dissolve in the mouth, swallowing occasionally as it dissolves.

3. If your cough is attended by expectoration seek to cough as moderately as possible; place yourself in the most comfortable position—a sitting posture with the body slightly bent forward is the best. Never cough while lying on your back. Hold a handkerchief before your mouth while coughing. Stop as soon as the expectoration is expelled. If the expectoration is difficult to dislodge, stop coughing; it will do no harm to wait until it comes up easily.

More or less cough results frequently from chronic post-nasal or pharyngeal catarrh; especially is there liability to prolonged coughing and retching when the patient, on getting up in the morning, finds the post-nasal space full of mucus which, by trickling down, causes discomfort, while the efforts for its expulsion lead to cough and at times to nausea and vomiting.

That such catarrhal states of the naso-pharynx and oro-pharynx

should have proper local treatment needs hardly to be mentioned, and in addition to the otherwise needful applications which we ourselves make, a spray which the patient himself can apply with a good hand atomizer will greatly aid in mitigating or in removing the catarrhal state. Such a spray may be made up of:—Iodine 2 parts, menthol, camphor, of each 4 parts, albolene 94 parts.

When the precautions and general measures enumerated, prove insufficient, when upon examination of the upper air passages we find no adequate cause, or when catarrhal or tuberculous affections are present in the upper air passages and are of such a nature or degree that they cannot be promptly influenced by local treatment, then direct treatment of the cough becomes necessary.

Although we may not always be entirely satisfied as to the actual causes which induce or maintain the cough in an excessive degree, we should, nevertheless, endeavor to seek a rational explanation in order to proceed with a definite object in the choice of the measures and remedies to be employed.

In certain instances we may have reason to suspect an unusual irritation of the reflex centres, by reason of a highly nervous temperament, in patients of the so-called erethic type. In others we may be led to suspect pressure from enlarged bronchial and tracheal glands, and if physical examination gives no direct evidence, we may still suspect such a relation in young subjects, the more so if they present other evidences of scrofula, or have enlarged cervical glands. We may be reasonably sure that pressure is responsible if there is also evidence of paresis of one or the other of the vocal cords.

In still other instances the tough tenacious character of the bronchial secretion may furnish an indication for treatment, and in the presence of extensive catarrh, especially when there is also evidence of emphysema, the treatment should be directed to the bronchial catarrh upon a more general plan.

Admitting that in our estimation of the relative causes we are liable to be mistaken, a good or even partially satisfactory theory, when based upon careful examination and study of the case, is preferable to no theory at all. With such a theory, we can proceed upon definite lines, by which we may either clinically confirm or disprove it, without immediately resorting in all cases to the sovereign remedy—opium, or its derivatives.

I have thus been able to control excessive cough by the simpler nerve sedatives, such as hydro-bromic acid, cherry laurel water, or syrup of wild cherry bark; at other times I succeeded with iodine, iodide of sodium, or hydriotic acid; again I accomplished my object with stimu-

lant or demulcent expectorants; and in many other instances, inhalation of soothing, stimulant or astringent remedies brought relief without the use of an opiate of any kind. It is true that I have not always made the right choice in the first instance and that in a considerable number of cases I was forced to employ heroin, codeine, or even morphine, in conjunction with other measures.

It is, however, so easy to prescribe and hand out opiates, and their use is so satisfactory in the immediate effect they produce upon the cough, that very often they are given in the first instance without even a trial of other means. A great many of my patients come to me with boxes of heroin, codeine, or morphine tablets, or bring with them cough mixtures which have one or another of these preparations as the effective ingredient. Not a few appear to depend upon such remedies and to have learned to increase the prescribed doses so much, that the withdrawal of the opiate is at times difficult, particularly when cough becomes again a more marked symptom.

While it is true that codeine and especially heroin in small doses does not have the harmful effect of morphine, their power to control the cough is proportionately less; when they are given in doses large enough to be as effective as morphine we also find incidental drug effects which, while differing in some respects from those of morphine, are nevertheless undesirable.

As already intimated these remedies should not be employed for the treatment of cough in phthisis as a matter of routine or of convenience, but should be reserved for actual necessity, and should be used sparingly even then. With painstaking general management and by means of other sedatives, internal expectorants, and other inhalants, we can, as a rule, control the cough sufficiently well to obviate the dangers and complications already mentioned.

Many patients have their paroxysms of cough at certain periods of the day, oftener on rising and on retiring than at any other times. Others cough most severely after meals, and in a minority only, is the cough continuous most of the day and night. Severe morning and night cough is most frequently seen in the confirmed stages of the disease, and is attended with more or less expectoration, the severity depending upon the difficulty with which the expectoration is dislodged and expelled.

In such instances, I recommend a glass of hot milk or of hot water to be taken before rising; to the latter may be added a little salt or bicarbonate of soda, and the milk may be given with seltzer or some other alkaline mineral water to facilitate the expectoration.

To prevent severe attacks of coughing in the evening or on

retiring the same measures may be employed; or which is to be preferred, an inhalation of the vapor of hot water or of a warm spray of 2 per cent. salt, or of bicarbonate of soda solution may be given instead.

If these measures are also unavailing and the secretions are still gelatinous in character or of tenacious mucus, I consider the internal use of stimulating expectorants combined with small doses of heroin to be indicated, and for such purpose I have used with advantage glycoheroin, the formula of which follows:—Heroin, 1-16 grain; ammon. hypophos., 3 grains; hyocyamus, 1 grain; white pine bark, 3 1-2 grains; balsam tolu, 1-4 grain; aromatics; glycerine, quantity sufficient to make one drachm.

As will be seen, this formula is an excellent one for this purpose and the amount of heroin, which is very small, is reinforced by the hyocyamus. Doses of one teaspoonful are usually effective for adults. The preparation is also very satisfactory in dry, irritative cough, and whenever an opiate containing expectorant is needed it will be found as satisfactory as any other ready prepared formula with which I am acquainted. It is permanent and unaltered by time and not unpleasant to take.

For simply facilitating the expectoration of tenacious mucus apomorphine is valuable and deserves more general employment than it now appears to have. A good way of prescribing it is as follows:—Apor-morphia, mur. cryst., 1 grain; acid. mur., 5 minims; distilled water, 4 ounces; a teaspoonful to be taken three or four times a day. The solution should be kept in a dark place and should be dispensed in black glass. The dose may be gradually increased to one and a half or to two teaspoonfuls, providing no nausea is induced.

Another valuable expectorant which has the effect of liquefying the secretions is iodine; it is best given in solution in the form of hydriotic acid, in doses of one to two drachms three times a day; or if preferred, muriate of ammonia in syrup of licorice, 5 to 10 grains every two or three hours, may be tried.

In this connection I should also mention a remedy which, although not strictly an expectorant, appears to have a selective influence upon mucous membranes of the respiratory tract. However its action may be otherwise explained the clinical fact remains, in my opinion undisputed, that its administration is usually followed by amelioration of the cough and by freer and easier discharge of expectoration. I refer to pure petroleum in the form of Angier's Emulsion which deserves to be better known, and to have a prominent place among the remedies for the treatment of cough in phthisis.

These internal expectorants may also be tried in the dry and irrita-

tive cough of the earlier stage, and at any period when expectoration is difficult on account of its tenacious character.

The cases most difficult to manage without opiates are those in which the patient is subject to paroxysms of coughing, immediately or soon after eating, which often continue until the stomach is relieved of its contents. These attacks of coughing may be entirely reflex; hyperaesthesia of the gastric mucous membrane appears to be responsible in some cases, while in others the fermentation of food due to gastric catarrh etc. produces an abundance of gas which, by distention of the stomach and upward pressure upon the diaphragm, causes reflex cough. As a rule the stomach should first have our attention and efforts should be made to allay its sensitiveness or to remedy the catarrhal conditions by appropriate treatment and diet before we resort to small doses of heroin or of codeine. If employed, the latter should be taken one half hour before that meal after which the patient experiences his attack.

When the cough is severe and more or less constant during longer periods of the day or night, one of the most successful measures is absolute rest in bed for several days during which counter-irritation in the form of hot flaxseed and mustard poultices should be applied to the entire chest. Counter-irritation may be thereafter continued by painting the chest with tincture of iodine every two or three days, after the cough has been sufficiently controlled to permit the patient to be up and to take exercise.

The treatment of cough with more or less distinctive features as here considered is based upon the following theories:—First, that the cough is chiefly due to local congestion and pathological changes of the mucous membrane of the bronchi or upper air passages which give rise to more or less dry, irritating cough, or:—Second, that the secretions are tenacious and difficult to dislodge and cause irritation by their presence:—Third, that there is an abnormal sensitiveness or hyperaesthesia of the mucous membrane which unduly heightens the reflex irritability of the nervous system, as a result of which the cough becomes increased in frequency and severity:—Fourth, that the cough is a reflex symptom from the stomach.

In addition to these causes we must now consider another, namely an excessive amount of secretion which forms and enters the bronchi so rapidly that cough becomes severe and frequent because of the necessity for outward discharge of the expectoration.

None of the foregoing methods of treatment are then applicable; on the contrary, having for their object the relief of local congestion, the increasing and liquefying of tough secretions or subduing of hyper-

aesthesia and reflex irritability, these measures may be contraindicated, since here the object is to diminish the secretions.

For this purpose the stimulating astringent remedies are required, and those who believe in creasote for the purpose of directly influencing the lung disease would employ it in preference to other remedies, either internally or by inhalation or in both ways. There is no doubt that creasote has a decided influence in lessening abundant secretions of the bronchi and its repute is, in my opinion, largely due to this effect. Kresotal or duotal being equally effective, they deserve preference over creasote and guaicol whenever we wish to save the patient the disagreeable eructations, or wish to guard against gastric disturbances from large doses. When otherwise convenient the internal use of kresotal may be combined with inhalation of creasote from an atomizer, or better still, the remedy may be introduced as a deep inhalation with a spray. The latter method is in use in the Winyah Sanitarium and the following formula has been found to be most effective:—

Oil of pine needles, eucalyptol, beechwood creasote, of each 5 parts; thymol, menthol, of each 2 parts; albolene, 81 parts:—as a stock solution for spray. For use in a coarse spray further dilution is necessary and according to the toleration of the patient and the effect produced, five to twenty parts are mixed with albolene and from 15 to 50 cubic centimeters of this mixture are sprayed into the trachea, while the patient inhales deeply.

When the secretions are predominantly purulent in character systematic inhalation of glycozone in a coarse spray has a decidedly favorable effect, by causing a marked diminution of the pus. This is the more observable in purulent catarrh of the larger bronchi with or without bronchiectatic cavities and also in suppurating pulmonary cavities if they communicate freely with a large bronchus.

For simpler astringent sprays, a 2 per cent. solution of tannic acid or $\frac{1}{2}$ to 1 per cent. solution of alumol may be tried; or the following formula for the use of sulphate of zinc may be substituted with the expectation of diminishing the secretions:—Tartaric acid, 2 grains; sulphate of zinc, 15 grains; water 1 ounce.

A more satisfactory inhalation with spray apparatus is the compound tincture of benzoin with a small addition of compound tincture of myrrh, but it causes much trouble with the spray tubes and tips by clogging; if employed the tubes must be cleansed immediately after they are used.

The formula for it is:—Compound tinct. myrrh 4 parts, fluid extract hydrastis 8 parts, compound tinct. benzoin 60 parts.

Instead of spraying the tincture we may, however, pour a teaspoon-

ful or two into boiling water and let the patient inhale the warm fumes, confining them by throwing a large towel about the head and over the vessel. The use of benzoin will be the most satisfactory in instances where the secretions are profuse and are retained. Internally benzoic acid may also be employed in doses of 10 to 20 grains three times a day. The acid is best given in capsules, and it is well to combine it with triturated camphor in the proportion of ten parts of the acid to two parts of the camphor.

For cough due to bronchorrhoea or to excessive secretion from cavities opiates are contraindicated, and I repeat again that in irritative or unavailing cough they should not be administered without first having given other measures a thorough and careful trial. When, however, they become indispensable, heroin or codeine acts in almost all cases sufficiently well to accomplish our purpose until we can give additional aid by the methods of treatment heretofore mentioned. The addition of heroin to our resources is the more gratifying since we can now change from the one to the other when the ineffectiveness of small doses would otherwise make an increase in the dose necessary. I rarely prescribe heroin in larger doses than 1-12 gr. by the mouth or 1-16 gr. of the hydrochlorate, hypodermically, and often I make my first trial with 1-16 and 1-20 gr. respectively. In an experience of several years with this remedy I have yet to see any unpleasant effect from such doses and rather than to increase them beyond those stated, I change to codeine, using small doses of it until these become ineffective, when I change back to heroin, a practice which with rare exceptions makes larger doses or the use of morphine unnecessary. As to the latter, I prefer to withhold it whenever possible, so long as there is any reasonable prospect of obtaining arrest of the disease. Whenever we begin its use for symptoms that are other than transient we must expect more or less difficulty and suffering in its withdrawal, and if the latter should be impossible it would be most unfortunate if, although we had accomplished a satisfactory result in the treatment of the lung disease, we had to face all that is implied by an acquired morphine habit. Even codeine when taken for long periods (and, as is usual, in increasing doses) will be difficult for the habitual user to give up, and while it may be otherwise with heroin I would not care to put its continued use in increasing quantities to a practical test.

The proposition is quite the reverse when opiates are able to remove suffering and distress in hopelessly advanced cases, and when by their use we can smooth the path to the end. In such cases it is our duty to give morphine as freely as may be required to prevent suffering and serious discomfort, although the dose may become quite large in the

end. Patients advanced in their disease to such a hopeless stage are, as a rule, unable to submit to effective local treatment for cough by sprays and inhalations, for want of strength, and even if they were able to do so such measures would rarely accomplish the object. Morphia judiciously given in this stage becomes really a means of prolonging life, the patient is less harassed by cough, he expectorates easier and less frequently, he eats better and gets more rest and sleep.

Before leaving this subject this seems a fitting place to consider the question of inhalants and inhalations from the general standpoint of utility in the treatment of phthisis, apart from their symptomatic application. I have seen no occasion to change the views on this subject which I expressed in previous writings, and which I last recorded in an editorial in the *Journal of Tuberculosis*, Vol. I., page 94.

While I have never denied the value of inhalations in the treatment of the catarrhal affections of the air passages, as set forth in the preceding pages, it is gratifying that the claims for direct and curative influences of the actual tuberculous disease are diminishing very rapidly. In an examination of the recent literature accessible to me, I have not found a single author of note who does not recognize the impossibility of such a mode of action of inhaled remedies, however powerful their germicidal properties may be, for the simple and all sufficient reason, that the inhaled remedies cannot be brought in actual contact with the tubercle bacilli or be deposited in their immediate proximity. Failing in this the theory of directly influencing the disease falls to the ground. If additional reasons were, however, necessary they appear readily upon reflection which shows that in concentration sufficient to become germicidal most of those heretofore proposed become irritants and irrespirable; granting, however, such an action in the dilution in which any of them can be used, further dilution must occur the moment they are deposited within the bronchi from which they would be expelled with the other secretions or would be absorbed into the blood. No advantage can therefore accrue over their administration through other channels, because in the end they can act only through the blood, in and upon tissues that are supplied with blood, and because the amount introduced by inhalation must not exceed the permissible doses by other routes. If more is used without symptoms of poisoning, it is because the excess is not absorbed, but is discharged outwardly with sputum. Finally the direct attack upon the tubercle bacillus by means of germicides must fail with all physical or chemical agents with which we are at present familiar, on account of the equal or greater resistance which this bacillus offers as compared with the living cells of the tissues in which it is lodged.

To destroy the tubercle bacillus in the tissues means to destroy the tissues as well; to weaken or to injure the specific germ cell means as much or more for the tissue cell.

The beneficial effects which are observed in actual practice when properly selected inhalants are applied naturally led to the belief that amelioration in cough, expectoration, and the often coinciding general improvement signified that the disease itself was being removed. For the superficial observer, especially when unacquainted with the nature of tubercle in regard to its formation, location and destiny, and with the pathological alterations which appear in the course of this disease this explanation was the only one within his reach. It likewise appealed greatly to the patient, and the proposition to apply the remedy by inhalation to the actual seat of the disease, after having had more or less endorsement in the treatment of phthisis by some members of the profession, is today exploited by every quack and charlatan as the exclusive means for actual cure.

That the laity should accept such a theory as a fact occasions little wonder when many medical men have done likewise. Although we are now practically agreed in properly assigning the observed benefits and in employing inhalations upon proper indications only, patients who are unacquainted with all that pertains to the correct appreciation of the limitations of such a method of treatment will ever fall ready victims to the plausible arguments of ignorant practitioners or dishonest pretenders and will place themselves in the hands of such for the treatment of symptoms, regardless of whether they require such treatment or not, and as a rule, to the exclusion of all other and often much more important professional advice and care.

To the end that afflicted patients may be preserved from the illusions and snares of pretended "curative inhalations," it becomes our duty to explain to the more intelligent class the natural limitations of topical applications to the respiratory surface, because the profession is itself largely responsible for the popular belief through similar claims from members in its own ranks, and because the proposition contains a partial truth in so far as such applications accomplish their legitimate aim within their limited sphere.

The improper use of inhalations is by no means harmless, it is liable to actually lead to catarrh of the normal air passages when the inhalant is of an irritating or too stimulating character; in some instances undesirable constitutional effects result when the quantity inhaled is excessive, or when the remedy is poisonous in small doses. Inhalations should, therefore, never become a routine method of treatment and

should be omitted entirely in all instances when the mucous surfaces are free from disease.

Relinquishing the proposition of directly influencing tuberculous processes in the lungs by inhalations, some of its advocates have moderated their claims in this respect, and have attempted the apparently more reasonable problem, namely that of at least disinfecting the bronchial and cavernous secretions in situ and in their outward passage through the larger bronchi.

The advantage of such disinfection may be open to consideration after its practical accomplishment is a demonstrated fact. So far it does not appear that success has been attained to such a degree that the sputum becomes markedly free from bacteria, or that it resists for a longer time changes of decomposition after its discharge, much less that it becomes sterile. I am, however, in sympathy with conservative efforts in this direction which if successful might limit or obviate the danger of complicating pneumonic processes and that of the extension of the tuberculous disease to other parts of the lungs from gravitation of otherwise infectious sputum or by its aspiration into smaller bronchi from cough.

I have myself, abstained from further attempts in this direction because sputum that would be accessible to the germicidal remedy is already in process of outward discharge and does not remain long in the bronchi; it is therefore exposed to the remedy but a short time. Regardless of time, however, an intimate admixture of sputum with the inhaled remedy is not likely to occur and the action of the latter would be confined to the enveloping mass of mucus upon which it would act only peripherally.

Granting that a liquid purulent secretion would become intimately mixed with the inhaled remedy, its strength and quantity is subject to so much greater dilution that it will become ineffective for the purpose for which it is used. As a guide we have the acquired experience with disinfection of expectoration after discharge, and the necessary amount of concentration of germicides for this purpose makes the outlook for success, to say the least, doubtful.

The secretions which are most liable to endanger the patient in the manner spoken of come, as a rule, from suppurating or necrotic pulmonary cavities; intra-tracheal injections of an ounce or more of mild germicidal fluids such as an iodoform emulsion have been practiced in the hope that by aiding its direction through a favorable position of the patient a large part may gravitate into and remain in the cavity.

In certain instances when the suppurating cavities were favorably situated, I have, myself, seen sufficient evidence of the feasibility of the

mechanical accomplishment of this method, as was clearly indicated by the immediately subsequent occurrence of gurgling râles in the cavity, and by the presence of iodoform in the cavernous sputum for 12 to 24 hours or even longer after the injection.

The attempt is rational and the benefits recorded by those who have had much experience justifies a painstaking trial in suitable cases.

When the expectoration is foetid, either because of decomposition before it is discharged or because of gangrenous or necrotic changes present in cavities, the internal administration of rectified spirits of turpentine and the inhalation of glycozon have given me good results.

TREATMENT OF PULMONARY HAEMORRHAGE.

When arriving at the bedside of a patient who is expectorating blood there is usually no material difficulty in determining the fact that the blood is being coughed up and comes from the lungs. In patients known to be suffering from pulmonary tuberculosis the instances where this assumption proves incorrect upon examination are so rare that few physicians take the trouble of making inquiry to exclude other sources.

But when the bleeding has already ceased and the patient has previously been in good health the physician upon his arrival may be confronted with considerable difficulty. Even in instances of confirmed phthisis I have found epistaxis to account for several mouthfuls of dark clotted blood that were expectorated after the patient had been asleep, the blood having been discharged into the naso-pharynx, and some of it having found its way into the larynx and trachea.

More difficulty still may be encountered when only traces of blood mixed with more or less mucus are shown as the cause of anxiety of patients or their friends; and in all doubtful cases it is a wise precaution to take nothing for granted; not even the apparent bloody color should be accepted as evidence of blood, especially in nervous or hysterical patients.

The usual sources of error which have come to my notice were bleeding from the nose, from the pharynx and from the gums; on two occasions the expectoration of red colored sputum was satisfactorily explained by admixture of saliva with a red gum lozenge which the patient had taken; and again expectoration of colored sputum was the result of red gum which had been used as an astringent application in the larynx.

One of my hysterical patients, who was fond of alarming those in attendance, learned to suck considerable quantities of blood from her gums, and was thus able to imitate the expectoration of blood whenever she was in a mood to enlist anxiety in her behalf; she had in this manner deceived her nurse and my assistant quite frequently before the intentional fraud was discovered. Additional errors which may have to be

excluded when blood is actually discharged from the mouth, are haematemesis and bleeding from the oral cavity itself. For avoidance of the latter simple inspection will suffice.

In epistaxis the expectoration of the blood occurs without cough or, if it has entered the larynx during sleep, it is usually brought up with an effort of hawking or of clearing the throat; the appearance of the blood is not fresh, but rather black and clotted and the quantity is small; bloody mucus or coagula may be drawn backward into the throat, and evidence of nose bleeding may be found by rhinoscopic inspection.

In haematemesis gastric symptoms especially pain have usually preceded, the blood is discharged with vomiting and retching, the color is black or resembles that of chocolate, there are usually small friable clots, the blood is often mixed with food, may be acid in reaction, and the stools show afterwards the bloody character by their black color. It should, on the one hand, not be forgotten that in haematemesis blood may enter the larynx with an inspiration and may then be expectorated. On the other hand it must be remembered that in hemoptysis some blood may be swallowed, giving rise to vomiting of blood or of blood mixed with food. In any considerable pulmonary haemorrhage, however, the bloody expectoration, for several hours or even days subsequently, may remove the doubt which the previous history, appearance of the blood, and examination of the chest may not have cleared up to our entire satisfaction.

Having determined that the blood is actually being coughed up and expectorated it is, of course, not as yet indicated that the lung itself is the seat of disease; nor does it necessarily imply that any existing lung disease is of tuberculous nature.

Although experience has shown that the great majority of pulmonary haemorrhages have a tuberculous basis, and that this diagnosis is the probable one until the contrary has been proven, it is, nevertheless, well that we take other causes into consideration, especially when from the clinical history and physical examination there is absolutely no justification to suspect tuberculosis of the lung, beyond the occurrence of the haemorrhage.

For all practical purposes it may be sufficient to call to the recollection of the reader the fact that pulmonary haemorrhage has been observed with almost every other affection of the lungs, and with disease of other parts and organs of the thoracic cavity; and that of these the affections of the heart (especially of the mitral valves), arterio-sclerosis, a general arthritic constitution, syphilis of the lung, injuries to the chest, acute pneumonias, acute and chronic bronchitis with bronchiectasis, med-

iaistinal abscess, tumors and aortic aneurism are the more frequent ones, perhaps in the order named.

As of still rarer occurrence I may mention influenza, vegetable and animal parasites, leprosy, malaria, very low temperatures and low atmospheric pressure of high altitudes; finally vicarious haemorrhages and those which have been observed in connection with disease of the nervous system, and abscess formation outside of the pleural sac.

To consider the semeiology and differential diagnoses of all these and other possible causes would extend this section far beyond its intended limit; in most instances their exclusion is easy enough because the tuberculous nature of the lung disease is unmistakable.

In the consideration of pulmonary haemorrhage in tuberculosis in the section of pathology and symptomatology, I have referred to the relative infrequency of hemoptysis in institution as compared with general practice, and have endeavored to show that the small percentage of haemorrhages observed in patients treated in special institutions is probably due to the control of the patient, especially in respect to rest and exercise; (physical and mental overexertion being the most frequent of all contributing causes).

If my explanation is the correct one, it follows that tuberculous patients treated in private practice are, as a rule, not sufficiently advised or controlled in this respect. This I believe to be true because many of those who come under my care state that they have received no particular advice or caution from their former medical advisers in regard to rest or exercise, and have never been warned against the dangers from overexertion, one of which is haemorrhage. Admitting that some patients, when not under constant medical control, are careless in spite of good advice, I believe that the recorded average of from 40 to 50 per cent. of haemorrhages occurring in patients who suffer from phthisis could be greatly reduced if all were painstakingly instructed as to the necessity of rest, and duly cautioned against the detrimental effects of physical and mental overexertion, especially in the active and progressive stages of the disease.

In most instances the occurrence of pulmonary haemorrhage means a relapse, however slight and temporary this may be, and in some instances the accident proves seriously detrimental to the future prospects of the patient. The serious consequences more immediately to be feared are suffocation, acute and chronic anaemia and indirectly the occurrence of pneumonia; as temporarily detrimental we must consider the actual loss of blood, the necessary restriction in diet, of out door life and of otherwise permissible exercise.

[TO BE CONTINUED.]

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